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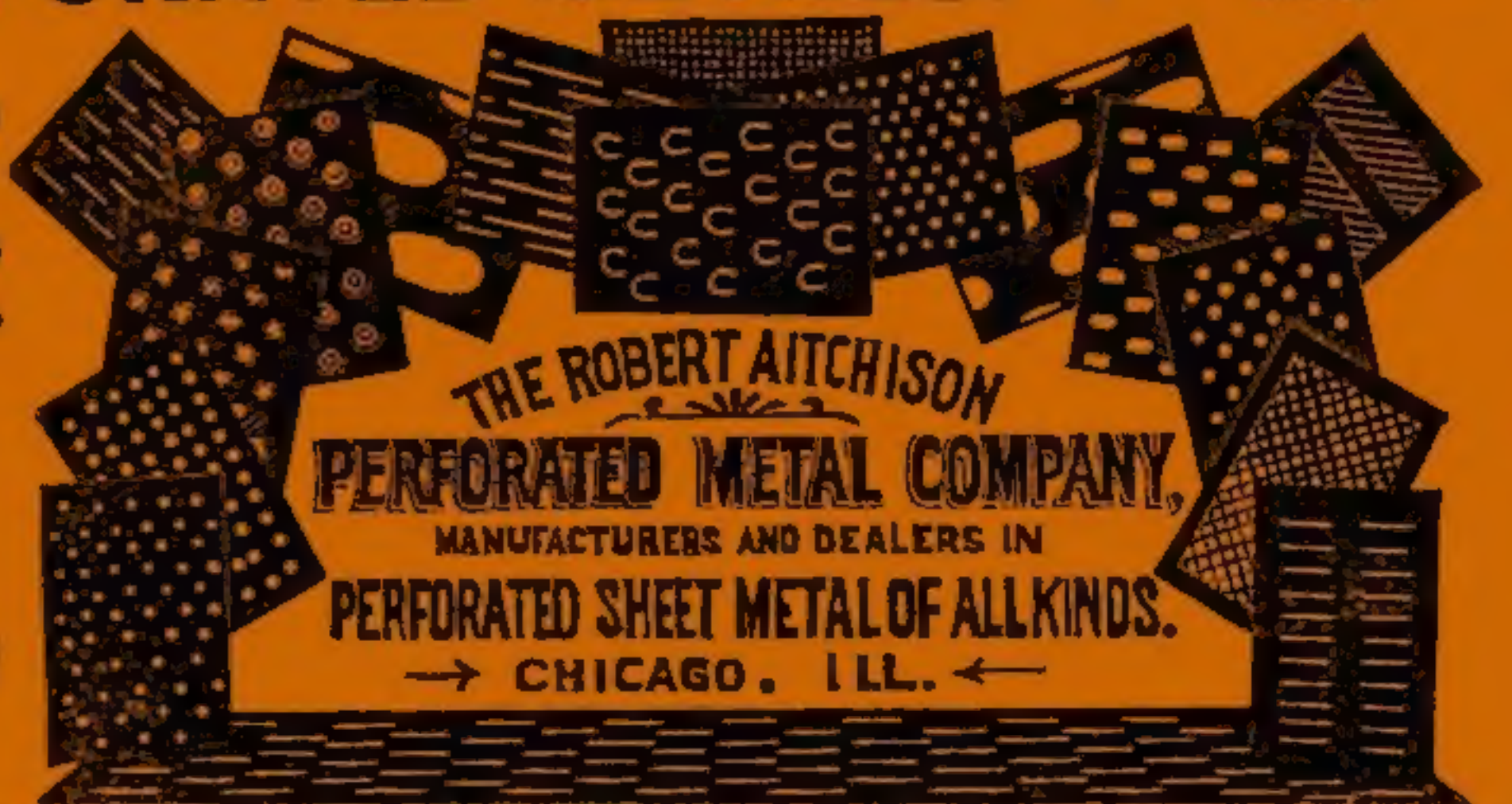
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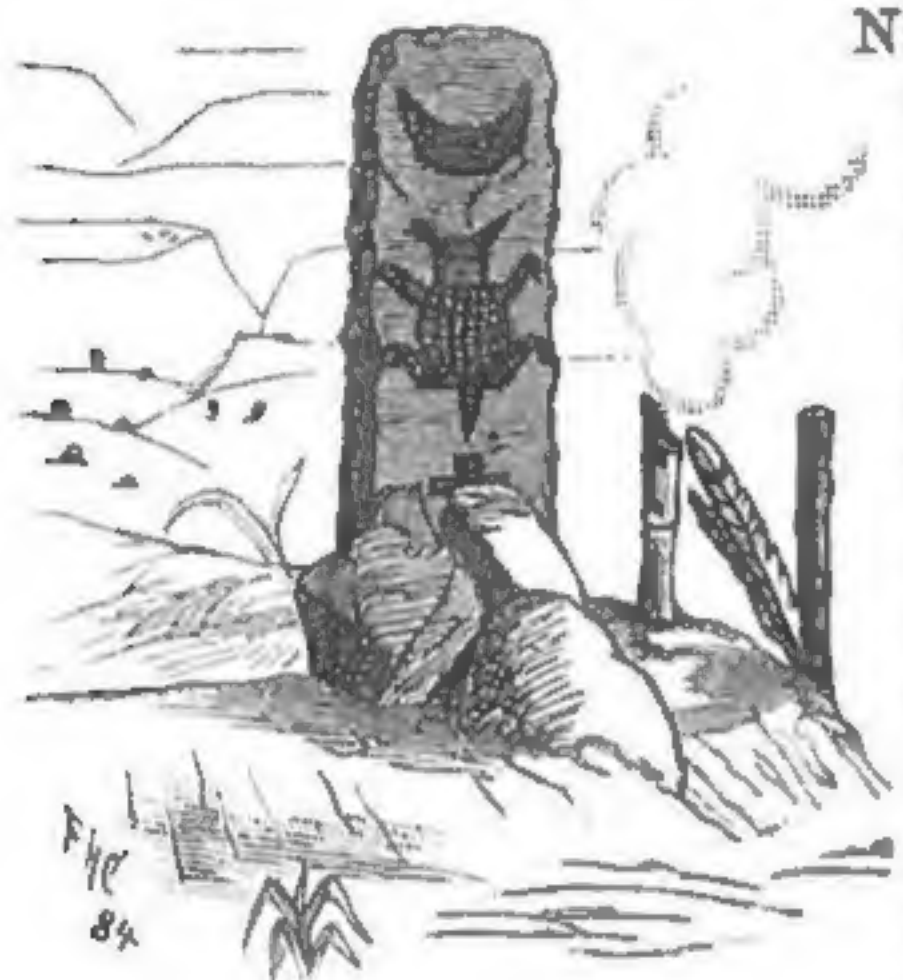
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ZUNI BREADSTUFF--IV.

A Chapter of Indian Land Law and Labor.

FRANK H. CUSHING.



NO BRANCH OF the Industrial Arts of the Zuni Indians is shown so clearly as in their farming customs and methods, first, the influences of climatic environments on a people's religion and culture, then the effects of this belief and

philosophy on their daily life. Before noticing these curious topics, however, a considerable—but I hope not wearisome—digression must be made, to give some idea of the land laws of Primitive Pueblodom.

In a former issue of this series the Zuni conception of the origin of Indian sociologic systems was given. Fundimentally these are the organization into *Gentes*, or Clans—the warp, so to speak, of the Zuni governmental fabric.

The Zuni tribe to-day (I shall speak of it frequently as a Nation, for of such it is the remnant) includes only between sixteen and seventeen hundred members. This population is divided first, into six sub-tribes each taking its name from the *Ki'wi-tsin*, or sacred house to which it belongs. Again, without reference to this plan of subdivision, the tribe contains thirteen organizations, orders or sacred societies, founded upon four primary elements in savage life; War, the Chase, the Priesthood and the Medical fraternities.

Yet again owing allegiance to neither of the preceding is a third sub-division, into the farming tribes which derive their names from the summer-pueblos near which their principal fields are located. The names of these geographic tribes are, in order of precedence, three:—*Tá'-la-kwe*,—"People of the Planting Town;" *He-sho-ta-tsi'-na-kwe*,—"People of the Pictured Town" (from the sculptured pictographs on the foundation walls of their village), and the *K'tap'-kwai-na-kwe*, or "People of the Town Whence Flow the Hot Waters." More important than any of the preceding in its relation to the tenure of corn-land, is the Gentile sub-division, for there are finally, irrespective of these, sixteen clans, or *gentes*. In order of their rank they are named as follows: The Parrot, or Macaw people, the Corn or Seed, the Badger, Sun, Eagle, Turkey, Crane, Deer, Bear, Coyote, Frog, Grouse, Tobacco, Spring-vine, (or Chickweed), Yellow-wood and Rattle-snake peoples. The Parrot and Seed *gentes*

are nearly equal in membership, either containing about three hundred. From these there is a dwindling down throughout the other *gentes* to five of the Yellow-wood people, and only one living representative of the Rattle-snake clan, a man, with whom of course, the *gens* will cease. Thus, it may be seen that one small nation is organized on four different principles, no one of which has, save in the religious aspect, dependency on any of the others.—(1) The Sacred government—according to the places of worship; (2) the Secular government according to landed and water possessions; (3) the Medical government—according to professions of "Medicines" and fetichism; and finally the Social government according to family organization. Were this paper treating rather of the Sociology, than of the food productions of the Zunis, I could show how these four kinds of sub-divisions harmonize with one another; how, indeed, the first three were the outgrowth of the fundamental social principle of the tribe, and how finally, with the addition of the phratral combinations of *gentes* (now modified or outgrown among the Zunis) all four features were well nigh universal to aboriginal America. As it is, I must confine further remarks to what these things seem to tell us of the pre-Columbian Pueblo-life, and to a discussion of the relation they bear to the land and water and food possessions of the tribe.

In addition to the *gentes* above named, Zuni tradition says that the tribe formerly possessed several others; the Water, the Macaw, (as distinct from the Parrot) the Crow, the Sea Serpent, the Red-house and the six corn-*gentes*, (Yellow, Blue, Red, White, Speckled and Black) now merged into one—the *Tá'-a-kwe*, or "Seed-people." The same traditions say that the Nation of to-day is a remnant of three great tribes, the Middle, the Southern and the Northern. At the time of these tribes, a vast area of New Mexico, Arizona and minor parts of the Southwest was covered by inhabited towns of them, few individuals living in a single place, and the people were more nomadic than at present. When at last these tribes confederated, and chose, one after another in the order of precedence above given, the great valley of Zuni as their permanent home, they numbered many thousands, inhabiting no fewer than nineteen towns. When discovered in the early half of the Sixteenth century by the Spanish Friar Niza and later subdued by Vasques Coronado, they were living in the famous "Seven Cities of Cibola." The native names of these towns were: *1, *Mát-sa-ki'*; 2, *K'id-ki-ma*; 3, *Ha-wi-k'uh*; 4, *Kia'-na-wa*; 5, *Ham-pas-sa-wan*; 6, *Ke'-tchi-na* (?) and 7, *Ha-lo-na*; the last being the only one of the towns now inhabited, save in summer, and the ancient name for modern Zuni, (*Halona*

*The Spanish names of these towns were, as may be seen below, invariably derived from the Zuni. (1) "Mazuqui," (2) *Coquimo*, (3) *Aguico*, (4) *Canabi*, (5)—?, (6) *Aguinsa* and (7) *Alona*."—From writings of Ad. F. Bandler, the authority on Spanish America, and old documents.

Ithwana—"The Middle Place of Happy Fortune," "The Middle Ant Hill of the World." [These diverse interpretations are both customary and etymologically correct.]

Although the early Spaniards doubtless exaggerated the population of Cibola, (more through imperfect means of getting data than from willfulness) in stating it as great as "Eleven thousand souls," we may safely conclude from a computation of the rooms in the six ruins above named, that altogether, they and ancient Zuni contained more than six thousand inhabitants. This seems only reasonable when we study the immense stock of lore, ritual and ceremonial of the tribe, and more than all else, the elaborate and highly differentiated organizations above mentioned. All these point not to a vast or dense population, but still to a very numerous and quite highly yet naturally developed ancestry.

When, during the years of the Pueblo rebellion (1680 to 1682), the Zunis sought to fortify themselves from Spanish vengeance on the Rock Mountain of Thunder, they had for nearly half a century been inhabiting six towns only. On the top of the Mountain of Thunder they built their town, not all together but in six different blocks or terraced masses, each mass representing one of the abandoned towns. This was significant. Great error has always been committed in considering the Indians, particularly the Pueblos, as (in our sense of the word) communists. Not even among ourselves is the division of property or individual land-tenure carried further. It is in consequence of a native method of speaking, law or custom regulating the disposal of land, that these curious people have come to be regarded as property communists.

Suppose that a young man belongs to the Parrot *gens*, he cannot marry any girl, however remote her relationship to him may be, who belongs to the same *gens*. As descent is on the mother's side, his children do not belong to him nor to his clan, but to his wife and her *gens*. If he, either before or after his marriage, "raises the sand," (takes up or clears) a field, it belongs strictly to him, but is spoken of as the property of his clan. In case he makes no provision that it shall descend to his children or to his wife; in case, moreover, he has no nephews or nieces on the sister's side, the property remains after his death, in the Parrot clan, may be claimed and cultivated by any member of that clan—preferably by near relatives—but neither by the man's wife nor by his own children. Any one man belonging to the tribe of *Nutria*, cannot, even of his own fields, give land to any one person belonging to either of the other pueblos, unless that person happens to be a member of his clan. Nor can any man living at *Pescado*, go and take up even unclaimed land at *Nutria*, or *Ojo Caliente*, unless with the consent of the body politic of the tribe which he wishes to join. No Zuni, whatever his rank, can, without the consent of the Corn and certain

other priests of the tribe, give any member of a stranger tribe or people, either portions of his own land or of any part of the tribal domain. With such a people as the Zuñi, therefore, the reservation from sale is, by their native tribal law customs, without intervention of government, already provided for.

The procedure by which a Zuñi seeks to bequest the lands which he has inherited or reclaimed, is curious. Nominally, as above explained, such lands belong to his clan. In bestowing them upon his children, by doing which, of course he transfers them to the clan of his wife, he has in the absence of all writing, to make arrangements in whatever one of the thirteen secret organizations of sacred medicine (*Ti-Kitla-pon*, or *Ti'-kta*) he may be a member of. In the presence of the council of this society, he states with great minuteness all the particulars of his bequest. Years may pass. Not one of his items is, however, revealed, unless by himself, until after his death. If then, any question arises, the members who listened to his declaration, acting as witnesses to one another, reveal what the will of the deceased had been. In illustration of their process nothing can be more interesting or instructive than an account of a lawsuit at which, as (at the time) Second Chief of the tribe, I once presided.

One evening in the autumn of 1881 my old brother, *Pa'-la-wah-ti-wa*, the Head Chief, said to me;

"Younger Brother, wash your eyes in cold water."
"Why?"

"An old beast who belongs to the clan of him who was his uncle, wishes to get a peach orchard away from his brothers [cousins] the children of the dead one."

Soon after I heard the herald call out a council from the distant house-tops.

The old man had only finished stuffing the big black throat of the family hearth with piñon sticks, when the members of the coming council began to steal in. Each was wrapped from nose to instep in his blanket, each, moreover, as grave and dignified as any senator of history. From the depths of each blanket would issue, as the threshold was crossed, the invariable greeting—"How be ye these many days?" to which was responded expressionlessly *Kets'-in-i-shi; i-ti-ni-k'ia!*—"Happy; gather and sit," by my brother, myself and all former arrivals.

Sheep pelts, dog skins, buffalo robes, retired blankets, four-pronged stool-blocks, bundle of corn-shucks and long slender rolls of dry cedar-bark were strewn about the floor, and a bag or two of rocky old plug tobacco was lying in the fire-light. As the council gathered in, everything except the shucks, cedar rolls and tobacco was appropriated as a seat, no sooner than which the place sounded like a hail storm on dry fodder—which sound resulted from the rustling of corn shucks—for every one who sat down—and none remained standing—immediately made a grab at the shuck pile and began to cut out a piece of husk with his thumb nail, of suitable length to serve as a cigarette wrapper. When cut, the shuck was dampened with the tongue and scraped to a proper state of thinness and pliability between the teeth. It was then neatly rolled to the shape of the prospective cigarette and stuck into the top of the legging to take form. Meanwhile a nubbin of the dried plug was attacked with the same thumb nail until a small quantity of coarse dust had accumulated in the palm of the opposite hand. Then the husk was unrolled, the pecked tobacco deposited in the last coil, and the wrapper without trouble rolled back to the shape it had been taking under pressure of the legging. As this process—tedious equally with its description—was completed at about the same time by two-thirds of the council, every person helping to make up that two-thirds called out at once, "*Ki'ithl'ihla'-kwi-mon-né!*" or "*Ki'ithl-u'-te-an-*

né!"—"Hither with the 'root!' or "This way with the 'blossom!'" the "root" being the roll of bark, the "blossom" the fire at the end of it. Now all these things are told of, because out of the two or three hundred councils and lawsuits I've attended they are the opening proceedings, as invariable as toasts are the fit endings of public dinners.

So far, all is peace. The call for the "root" and "blossom" means just as many clear, tiny blue columns of smoke as there are mouths in the room. It means too, such universal contentment that wild, very witty, somewhat coarse jokes and general uproariousness begins, even a few practical—not very gentle pranks, and any quantity of sarcasm, make the place as nearly like as it can be in Zuñi, to a meeting of jolly students bent on a lark.

I sit next my "Old Brother" who has uttered never a word save the responsive "Happy; gather and sit!" since he took his station by the fire-side. There is order in this chaos. If you look carefully, there is a little space along the middle of the room, ranged on either side of which is a party. As yet, however, every pair of lips not smoking a cigarette is stretched with a broad grin, every arm vigorously gesticulating—that is, with four or five exceptions. One of these is a sullen looking old fellow, who sits like a Zuñi eagle after "picking time," on his stool, smoking his cigarette and glaring into the fire. The other exceptions are (unless my bored brother be included) one or two despondent looking young men. It need not be told that these are the characters concerned in the issue. I edge over closer to the Old Chief.

"Brother!"

"Ha?"

"Why is this orchard quarreled about?"

"Shut up!"

"But I want to know."

"Well, that's what these beasts are here to cackle about."

The old man deliberately finishes his cigarette—the joking is as loud as ever—then suddenly throws the stump away, spits, and hisses, "*Shssshh*," and says with a frown and a curse:

"Shut up, you beasts!"

For a moment no effect is produced. I thump on the stone floor with a staff of office and yell (being echoed by every sub-chief in the room) "*H'i'tá!*" which means "Listen." Every eye turns toward the now composed chief. With the gentlest demeanor possible, with absolute ignorance and lack of feeling expressed in the tone of his voice, the old man says to the silenced council:

"My Brothers and Children, 'why and wherefore' are we gathered together this night? For, it is not for nothing that people meet one another in council?"

This is the signal! The mine has been fired! Both sides start up at once. Positive pandemonium ensues. I yell at the top of my lungs:

"One at a time, *one, one!*"—and every sub-chief cries—"H'i'tá!"

The clatter runs on for a moment—having boiled over in fierce personal abuse—until I jump up and yell:

"Shut up, every one of you; *shut up!*"—and again the sub-chiefs shriek, "*H'i'tá! h'i'tá!*"

Silence reigns. A sub-chief rises up, goes over to the front of the sullen smoker (the picked eagle) and sits down.

Two others of like rank come forward and sit down so as to face him, forming a breastworks, as it were, of despondent young men. Then the real business begins!

Now with regard to the officers of a Zuñi council of law.

The head chief is the Judge. His function is to as nearly resemble a dirtily dressed stone statue in

sitting posture as possible. Throughout the proceedings—save to occasionally grunt a curse, look exceedingly disgusted and smoke unceasingly—he fulfills this mission perfectly.

The second chief is at once "Sergeant-at-Arms" and Justice or, more precisely, Secretary. In the former capacity he has to rage and swear and thump the floor with his staff, jumping up, sitting down, and expressing ferocious wrath in his every action but keeping his heart as imperturbed as a Hindoo rishi's during penance.

In the second capacity, he has to listen intently! This, with a view of straining twenty-five minutes of serious significant statement of fact, out of from five to seven midnight hours of vituperant recrimination and violent personal abuse, which scorns not to rake up from the traditionary tribal annals, every scandal, calumny and other vicious bit of back-bite comprised within at least two antecessorial generations of the parties "mentioned the council." Add to this the fact that the "lawyers" (the sub-chiefs to a man parceled equally to either side) occasionally in their warmth of zeal get into a little private discussion and reach such heat that the words of three or four of them let off simultaneously with those of a like number opposite, fairly strike fire (or ought to) in crossing; that the witnesses amounting to a dozen or so chime in with charming vigor, and you have some conception of the work he has to do, in order to distill from all this, enough material to make a clear recapitulation or "brief"—leaving out no single pertinent detail—to the silent judge toward the end of the proceedings.

This office, it has been my happy lot to fulfill a few times! Happy, I say, because it was exciting and a better educator of the faculties of perception and memory than all the courses in Oxford, though (I must confess) in other respects not quite so edifying.

Now in telling this I hope I have served two purposes. Have given a near account of this particular lawsuit up to the production of my brief, and have demonstrated the fallacy of the sweeping assertion—"Two Indians are never known to speak at once." I grant this, but mind; I grant it simply because, during all my experiences while fulfilling the office of second chief, I never, by any amount of floor-pounding, could induce fewer than from five to fifteen to speak in the same breath.

When I turned to state the case to the Governor the substance of it proved to be about as follows. Only the interest of the whole council in what was to be presented to the Head Chief for his judgment—with the added taint of a desire to criticise—can be adduced to explain the silence which prevailed during its utterance:

"The old man died last year leaving one girl and two sons, all well grown. When these children were young the 'dead one' with their assistance and that of an old friend, planted a large peach orchard. This has grown up, is fruitful and contains eighty-six trees. The nephew claims he is the dead one's son in inheritance because the son of his sister. That the old man who was never arranged to make his *very* children his children in inheritance. He, therefore, wants the whole orchard. Now the talkers of the children of him who was, say that the nephew caused the old man years of 'thought' (anguish) by his laziness, impudence, gambling and consequent wish to have things for nothing; therefore, the peach orchard could not have been thought of for him by the dead one; that the children helped plant the orchard and care for its growth, which the nephew had not aided in; hence, even if the father who was had not 'brought words to the sitting place of his brothers' he intended his very children should have that which he had 'looked upon with

labor' and they deserved it, nevertheless, above the nephew.

"The question is, 'What did the old man who was, want — ?'"

"Wait!" replied the Head Chief, as though he had suddenly thought of something, but with a suspicious grin on his face.

"Here, 'Bit by a Bear,' and you 'Arrow-Scratched' and you, too, 'Straw Counter'" [the old man was addressing his sub-chiefs] "'w'ant after' the four oldest men in the Cactus band, [society of surgeons] run quick!" So the three sub-chiefs betook themselves to remote and widely separated parts of the pueblo.

Meanwhile the joking was resumed, but I noticed that some of the chief disputants turned their backs on one another. Still the question in hand was dropped *pro tem*.

Soon returned the three sub-chiefs with as many sleepy old men staggering after, and the rear brought up by an antiquated ex-chief. "The other couldn't be found," they said, and sat down to cut shucks.

"Thou hast come," said the Chief (addressing the nearest of the fresh arrivals). "What's your heart up to?"

"Sleep!"

"Oh! I thought it was meditating mischief because these rattle-mouths [a wave at the sub-chiefs] made it necessary to pull you out of your dreams. Can you tell me where 'Dried Bean Pod' is?"

"Why here; he came along with us!"

As the one thus designated, after being vigorously punched (he was somewhat deaf) came forward winking his eyes in the fire-light, I giggled.

"What are you laughing for?" said the Head Chief.

"Has the grandfather no other name?" said I.

At this the whole council grinned, (the "Dried Bean Pod" not so much, for he didn't hear), while the Old Chief explained that "This was the best *known* name but not the *best* one the old man had, as his 'Cactus name' was *Iu-at-tih-st-wa*, which meant nothing but his name, but that '*Thlap'-K'us-na*' was the best for a council, because young people never remembered *Ti'-K'ia* names, nor those given by *gentes* at birth. My brother finished by declaring apologetically to the council:

"You see the young brother is smart, and the best 'side carrier' [assistant] I ever had, but he grew up

on '*Me-u-kān*' milk, therefore doesn't know everything! *Sst!*"

The last exclamation, the cut-off hiss "*Sst!*" brought the council to order, and I recapitulated at the top of my voice in the Dried Bean Pod's deaf ear.

"Ah! ah!" croaked the old fellow, when I had finished, poking an empty shuck at me for "sneeze stuff" (powdered American tobacco) and saying that his thumb-nail was broken.

Occasionally appealing to his two companions,

"Oh! ah! yes, yes! you see it was in winter time; —no, near spring, not long after the cliffs on Grand mountain caved in and we thought the world was going to vomit corpses, and sent fine turquoises, prayer meal and shell beads to harden the earth; — isn't that so, younger brother?"

"Yes."

"Yes, and just before we broke up god *Po'shat* for burning the forests."

"Yes, yes."

"Well, he said to us when we were 'In [fasting] for the third day,' said he, 'You see no one can tell how long daylight may last, my brothers, therefore I say this day my cornfields except one I give to my two boys, the one to my girl; my peach orchard I want to divide half and half between *Wa-mu*, my nephew, (unless he turns out bad), and my my very children all; but then *Wa-mu*, because he is a bad boy and does not love me——"

"You lie!" shrieked the said *Wa-mu*, "My uncle never said so!"

"Shut up!" said I.

"What?" queried the deaf old man. "Ah yes, says he, for that reason, and because he may turn bad he must give part of the trees to my brother *Chu-pa-thla'-shi-ka* (Old Corn Bin) because Old Corn Bin helped me, and he didn't. So, ain't it, brothers?" concluded the Dried Bean Pod.

"True! true!" echoed the others.

"That will do, Dried Bean Pod," said the chief, and the old man was glad to resume exclusively his cigarette.

Now then, fury redoubled! *Wa-mu* howled to prove that he had always been faithful and good. Everybody on one side accused everybody on the other side of unreliability, citing numerous instances as proof, until I yelled:

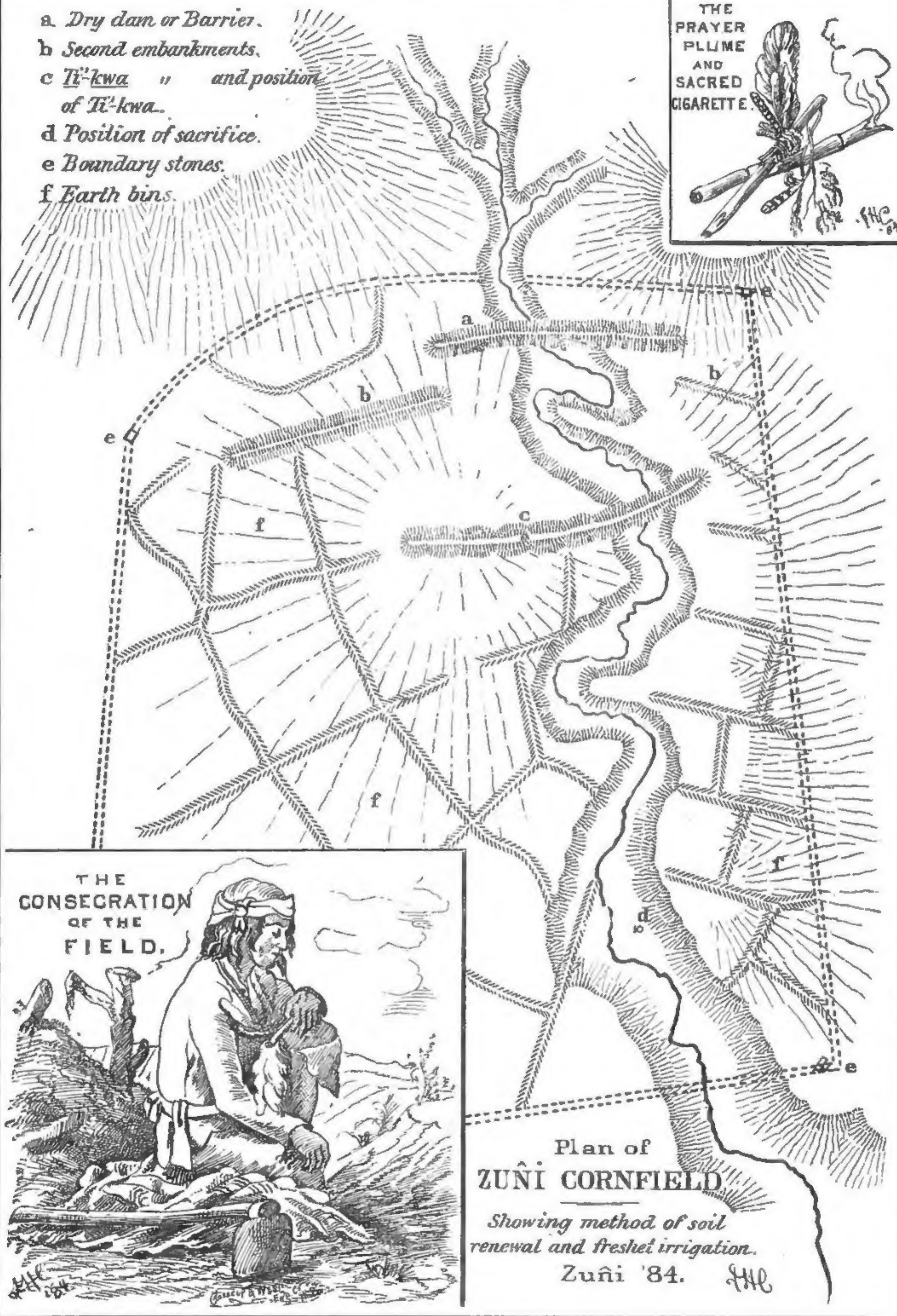
"Shut up, all of you!"

They were silenced after a fight of five minutes or so.

"Now," said the Head Chief to me in an undertone, "Ask the Old Women's Governor [the ex-chief mentioned above] to scathe these sub-chiefs; they're fighting on their own accounts, you see, to prove which is past the other in lying."

The Old Women's Governor needed only a hint. He kept his eyes closed or squinting, for

†A priest executed some twenty years ago on charge of witchcraft. The name is a contraction of *Po'shat-ang-kiu* —the god of medicine orders.



this old dotard gave a history of his childhood, his initiation into the Cactus Band and that of the deceased, hints of the Mexican war, the first coming of Washington (Americans), the Navajo wars, the starvation times, copious draughts from his ritual-stored brain showing the duty of every *Ti'-k'ia* member, until he worked down to the time when the orchard had been planted and—stopped!

"Yes, yes, but did the dead never tell what should be done with the orchard?"

they were sore, but he turned them toward me. "Talk to these children?" said he, ironically waving his lean hand over the heads of the wrangling chiefs, "these are the days when every 'Slender bone' [ungrown boy] swallows shame and vomits impudence, and 'chiefs' ha, ha! ho, ho! chiefs think such talk is wisdom, so they try to imitate it. They only rattle, rattle, do you hear me? When I was young a chief thought his duty was to travel the middle trail, but these, *these*, why they split apart as a band of runners do meeting a mud puddle and sling brine [caustic words] at one another from either side."

"So! so! True! true!" exclaimed the chief, and I said "*H'i-tâ*," whereupon, behold! every sub-chief looked at every other and said "*H'i-tâ*!"

"Sit down, old man, it's useless! The morning star is up!" said the Head Chief, addressing Old Women's Governor. Then turning to me he asked:

"How much has it gone on, Younger Brother?"

So I repeated the essential features of the Dried Bean Pod's evidence.

"Listen?" said *Pa-lo-wah-ti-wa*. He then waited for about five minutes and the council clamored for his decision, but he waited. He seemed intent only on finishing his cigarette, but there was a thoughtful expression on his face. Then he said quietly, not a single ray of emotion in his eyes:

"Brothers, it seems *Wa-mu* is a bad man, but he belongs to the clan of his uncle who was. He shall have forty trees, and as he wouldn't of his own accord (because he wanted the whole orchard) give a sprout to the Old Corn Bin, he shall be told to have thought of giving eight trees to this old friend of his uncle for helping to plant the orchard, which *Wa-mu* did not do. The rest of the orchard shall belong to the dead one's children, and they shall give how-many-soever they like to the Old Corn Bin. Day after to-morrow Scratched by an Arrow, the Straw Counter and I will go to lay out the boundaries, and my Younger Brother here [referring to me] shall do as he likes. Thus much!"

I expected to hear a torrent of dissatisfaction, but every one said as meekly as catechised children, "Indeed!" or "It is well!" and this is the rule, as the decision of a Head Chief on such occasions is final. When I said, "Thus much we have straightened our thoughts, see that complaint crooks them not again," which meant the council was over, light spirits seemed to descend from the dense blue clouds of tobacco and corn husk smoke among the rafters, and the jokes, pranks, gossip resumed sway once more, merged soon into yawns and remarks on the nearness of dawn, and then one by one the party left, seeming wafted through the open doorway out into the silent gray light by the draught-drawn smoke-clouds.

As I turned to roll up in the corner the old man who was cleaning away the "lame shucks" and "dead cigarettes" remarked with a dyspeptic grimace "What kind of animals do they most resemble, prairie dogs or bumble-bees? Well, they're not to blame after all, for since those bearded beasts, the Mexicans, came, we never have had decent chiefs or dignified councils. No, we have had to sit as though watching for daylight, with the interrogation of every small question. May you happily wait until the morning, Younger Brother."

Two ends have been served by this long account. Relative to lands, the rights of water, the trespass of animals and children, lawsuits are the order of the day (or rather night) of each autumn. As they are all carried on in much the same way, this description of one shall stand for the many which must be mentioned hereafter. Moreover the law custom regulative of the transfer of land by bequeathal from one clan to another has in the above a fair, although only partial illustration.

When a young Zuni wishes to add to his landed possessions, he goes out over the country, caring to all appearance, nothing at all for distance. He selects the mouth of some *arroya* (deep dry gully or stream course) which winds up from the plain into the hills or mountains, and seeking, where it merges into the plain, some flat stretch of ground, his first care is to "lift the sand." This is done by striking the hoe into the earth at intervals of five or six yards, and hauling out little heaps of soil until a line of tiny boundary mounds has been formed all around the proposed field. Next in this space he cuts away the sage brushes with his heavy hoe, and clods of grass, weeds, etc., all of which he heaps in the middle of the field and burns. He then throws up long banks of sand on the line first indicated by the heaps of soil. Each embankment is called a *so'-piti-thlan* [sand string]. At every corner he sets a rock, if possible columnar, sometimes rudely sculptured with his tokens [see Initial Letter]. It is rare he does anything more to the piece in a single year. Not unfrequently even years before the land is actually required for cultivation, the "sand is lifted" and a stone of peculiar shape is placed at one corner as a mark of ownership. Ever after, the place is, unless relinquished, the exclusive property of the one who lifted the sand, or, in case of his death, of the clan he belonged to.

In riding over the ancient country of the Zunis I have sometimes found these rows of little soil heaps as many as forty miles away from the central valley. Even after the lapse of years, overgrown with grasses, each the bases of a diminutive sand-drift, these marks of savage preëemption are distinct. Thus too, for ages they will remain to serve the archaeologist when the Zuni and his theme shall have passed away, as material for speculation. Distance could not have been the sole cause for the abandonment of these pieces, as some fields, still under the hoe, are equally as far away; yet give evidence of having been cultivated, probably in consequence of great fertility, for several generations.

With the Zunis one-half the months in the year are "Nameless," the others are "Named." The year is called "A Passage of Time," the seasons "The Steps" (of the year), and the months "Crescents"—probably because each begins with the new moon. New Year is called the "Mid-journey of the Sun," that is, the middle of the solar trip between one summer solstice and another, and, occurring invariably about the nineteenth of December, usually initiates a short season of great religious activity. The first month after this is now called *I'-koh-pu-yâ-tchun*, "Growing White Crescent," as with it begins the Southwestern winter,—the origin of the name is evident. The *ancient* name of the month seems to have been different in meaning, although strikingly similar in sound, *I-shoh-k'o'a-pu-yâ-tchun* or "Crescent of the Conception," doubtless a reference to the kindling of the sacred fire by drilling with an arrow shaft into a piece of soft dry wood-root, a ceremony still strictly observed. Interesting evidence of this meaning may be found on the old notched calendar-sticks of the tribe, the first month of the new year being indicated by a little fire socket at one end.

The second month is *Ta'-yâm-tchu-yâ-tchun*, so named from the fact that it is the time when boughs are broken by the weight of descending snow.

Then follows *O-nan-ûl-ak-k'ia-kwum-yâ-tchun*, or the month during which "Snow lies not in the pathways," with which ends winter or the "Sway of Cold."

Spring, called the "Starting Time," opens with *Thli'-te-kwa-na-k'ia-tsa-na-yâ-tchun*, or the month of the "Lesser Sand Storms," followed by *Thli'-te-kwa-na-k'ia-thla'-na-yâ-tchun*, or the month of the "Greater Sand Storms," and this, the ugliest season

of the Zuni year, is closed by *Yâ-tchun-kwa-shi'-o-na*, "The Crescent of No Name." Summer, Autumn, the period of the "Months Nameless," together called *O'-lo-i-k'ia*, the season "Bringing Flour-like Clouds." In priestly or ritualistic language these six months although called nameless designated successively the "Yellow, Blue, White, Variegated or Iridescent, and Black," as the colors of the plumed prayer-sticks sacrifice rotation at the full of each moon to the gods of North, West, South, East, the Skies and the Lower Regions.

In common parlance these months and the nute divisions of the seasons they embrace, are referred to by the terms descriptive of the growth of corn-plants and the development and nature of their grain. There will be, on a future page occasion to illustrate the tendency of the Zunis to recognize the standard of measurement and comparison not only for time, but for many other things, by reproduction of a singular song of one of the sacred orders.

Early in the month of the "Lesser Sand Storms" the same Zuni, we will say, who preëempted the year since, a distant *arroya*-field goes forth hoe in hand, to resume the work of clearing. Within the sand embankment he now selects a portion which the *arroya* enters from above, cutting many forked cedar branches, drives them firmly into the dry stream-bed, in a line across the course, and extending a considerable distance beyond either bank. Against this row of stakes he places boughs, clods, rocks, sticks and earth, so as to form a strong barrier or dry-dam; open, however, at either end. Some rods below this on either side of the stream-course, he constructs, less carefully other and longer barriers. Still further down the stream he seeks in the "Tracks" of some former torrent a ball of clay, which, having been detached from the native bank, far above, has been rolled and was down and down, ever growing rounder and smoother and tougher, until in these lower plains it lies bedded in and baked by the burning sands. He then carefully takes up, breathing reverently to it, and places it on one side of the stream-bed, where it is desirable to have the rain-freshets overflow. He buries it with a brief supplication in the soil, then proceeds to heap over it a solid bank of earth, which he extends obliquely across, and to some distance beyond the *arroya*. Returning, he continues the embankment past the clay ball either in line or at whatever angle with the completed portion seems to his practiced eye most suited to topography.

To those not acquainted with savage way of thought, this proceeding will gain interest in explanation. The national game of the Zunis is *Ti'-kwa-we*, or, The Race of the Kicked Stick. Two little cylindrical sticks of hard wood, each the length of the middle finger. They are distinguished one from the other by bands of paint, are laid across the toes of either leader, and kicked in the direction the race is to be run. At full speed of the runners these sticks are dexterly shoved up on the toes, and kicked on and on. The party which gets its stick over the goal first counted the winning side. This race is usually by no fewer than twelve men, six opposed to six, of equal number. The distance ordinarily accomplished without rest or even abatement, is two or three miles. Now the time taken in running this is marvelously short, never exceeding three hours, yet, were you to ask one of the runners to under- take the race without his stick, he would flatly tell you he could not possibly do it. So imbued with this custom are the Zunis that frequently, when coming in from distant fields, and wishing to make haste, they cut a stick, and kick it on ahead of them, run

to catch up with it and so on. The interesting feature about all this is, that the Indian in this, as in most things else, confounds the cause with the effect, thinks the stick helps him, instead of himself being the sole motive power of the stick. The lump of clay before mentioned is supposed to be the *Ti'-kwa* of the water gods, fashioned by their invisible hands and pushed along by their resistless feet, *not* hindering, but adding to the force and speed of the waters. The field-maker fancies that the waters when they run down this trail again will be as anxious to catch up with their *Ti'-kwa* as he would be. So he takes this way of tempting the otherwise tameless, he thinks, torrents out of their course. Yet, to make doubly sure, he has thrown a dam across their proper pathway. On the outskirts of the field thus planned, little inclosures of soil, like earthen bins are thrown up wherever the ground slopes how little-soever from a central point, these inclosures being either irregularly square or in conformity to the lines of the slope.†

My hope has been in so minutely describing these beginnings of a Zuñi farm to give a most precious hint to any reader of THE MILLSTONE interested in agriculture, or who may possess a field some portions of which are barren because too dry. We may smile at the superstitious observances of the Indian agriculturist, but when we come to learn what he accomplishes, we shall admire and I hope find occasion to imitate his hereditary ingenuity. The country of the Zuñis is so desert and dry, that times out of number within even the fickle memory of tradition, the possession of water for drinking and cooking purposes alone, has been counted a blessing. Yet, by his system of earth banking the Zuñi Indian and a few of his western brothers and pupils—the Moquis—have heretofore been the only human beings who could, without irrigation from living streams, raise to maturity a crop of corn within its parched limits.

The use of the principal barriers and embankments may be inferred from the terms of the invocation with which the field is consecrated after the completion of all the earthworks. The owner then applies to whatever corn-priest is keeper of the sacred "medicine" of his clan or order. This priest cuts and decorates a little stick of red willow with plumes from the legs and hips of the eagle, turkey and duck, and with the tail-feathers from the *macmillan's* say, night-hawk, yellow-finch and ground-sparrow, fastening them on, one over the other, with cords of fine cotton. From the store of paint which native tradition claims was brought from the original birth-place of the nation (a kind of plumbago) he takes a tiny particle leavening with it a quantity of black mineral powder. To a sufficient measure of rain water, he adds a drop of ocean water with which he moistens the pigment, and with a brush made by chewing the end of a yucca-leaf, applies the paint to the stick. With the same paint he also decorates a section of cane filled with wild tobacco supposed to have been planted by rain, hence sacred! These two objects, sanctified by his breath, he gives to the applicant. Taking them carefully in his left hand, the latter goes forth to his new field. Seeking a point in the middle of the arroya below all his earthworks, he kneels, or sits down on his blanket facing east. He then lights his cane cigarette and blows smoke toward the North, West, South, East, the Upper and the Lower regions. Then holding the smoking stump and the plumed stick near his breast he says a prayer. From the substance of his prayer which, remarkably curious though it be, is too long for literal reproduction here, we learn the important facts relative to his intentions and his faith. We find he believes that:

†In an accompanying plan I have attempted to give some idea of these features of an Indian cornfield.

"He has infused the consciousness of his prayer into the plumed stick; that with his sacred cigarette he has prepared a way 'Like the trails of the winds and rains' [clouds] for the wafting of that prayer to the gods of all regions. That having taken the cloud-inspiring down of the turkey, the strength-giving plume of the eagle, the water-loving feather of the duck, the path-finding tails of the birds who counsel and guide Summer, having moreover severed and brought hither the flesh of the water-attracting tree, which he has dipped in the god-denized ocean, beautified with the very cinders of creation, bound with strands from the dress of the sky-born goddess of cotton—he beseeches the god-priests of earth, sky and cavern, the beloved gods whose dwelling places are in the great embracing waters of the world, not to withhold their mist-laden breaths, but to canopy the earth with cloud banners, and let fly their shafts little and mighty of rain, to send forth the fiery spirits of lightning, lift up the voice of thunder whose echoes shall step from mountain to mountain bidding the *mesas* shake down streamlets. The streamlets shall yield torrents; the torrents, foam-capped, soil-laden, shall boil toward the shrine he is making, drop hither and thither the soil they are bearing, leap over his barricades unburdened and stronger, and in place of their lading, bear out toward the ocean as payment and faith-gift the smoke-cane and the prayer-plume. Thus thinking, thus believing, thus yearning, thus beseeching, (in order that the seeds of earth shall not want food for their growing, that from their growth he may not lack food for his living, means for his fortune) he this day plants, standing in the trail of the waters, the smoke-cane and prayer-plume.‡

The effect of the net-work of barriers is what the Indian prayed for—attributes, furthermore, as much to his prayer as to his labors—namely, that with every shower, although the stream go dry three hours afterward, water has been carried to every portion of the field, has deposited a fine loam over it all and moistened from one end to the other, the substratum. Not only this, but also, all rainfall on the actual space is retained and absorbed within the system of minor embankments.

At the stage of operations above last described, the field is again left for a year, that it may become thoroughly enriched. Meanwhile, during the same month (the first of spring) each planter repairs the banks in his old fields, and proceeds to adopt quite a different method for renewing or enriching the soil.

Along the western sides of his field, as well as of such spots throughout it as are worn out or barren he thickly plants rows of sage-brush leaving them standing from six inches to a foot above the surface. As the prevailing winds of the Zuñi plains hail from the southwest, and as during the succeeding month ("the Crescent of the Greater Sand Storms") these winds are laden many tens of feet high in the air with fine dust and sand, behind each row of the sage-brush a long level, deep deposit of soil is drifted. With the coming of the first—and as a rule, only—rain-storm of the spring-time, the water, carried about by the embankments, and retained lower down by the "earth bins" redistributes this "soil sown by the winds" and fixes it with moisture to the surface it has usurped.

Thus, with the aid of nature's hand, without plow or harrow, the Zuñi fits and fertilizes his lands, for the planting of May-time, or the Nameless month.

‡The kind of philosophy which can give rise to faith in this remarkable reversal of nature's order—making the growth of willows the explanation of the presence of waters, instead of the consequence; making summer birds the *bringers* of summer instead of summer the incentive of their yearly migration—is, strange as it may seem, the teaching of nature by her appearances, for natural philosophy is hidden under natural phenomena. Therefore, wonder not, ridicule not the retrogressive reasoning of savages. Rather, look to this, this one great dissimilarity between child-mind and civilized mind, as the fruitful cause of misunderstanding between the American and the Indian. A misunderstanding which will end, moreover, only with the death of this peculiar philosophy or the doom of its devoted adherents.



In Berlin electricity has been applied to the hatching of chickens. The eggs are placed in a circular box, or incubator, over a coil of wire, and this heated by the electric current. A thermometer automatically regulates the temperature by cutting the wire coil out of circuit, when the heat becomes too great.

A fire-proof ceiling has been invented. It is composed of tiles supported from joists by hangers, and hanging facing tiles placed against the sides of the joists and top tiles placed between the upper parts of the joists. The top tiles and tops of the joists are covered with a layer of cement, rendering the ceiling secure against fire.

A French inventor, who has patented a machine for the use of concentrated solar rays as a general motive power, has set up three of his machines in Algeria for the French government. He is now carrying on experiments at the Island of Porquerolles, near Hyeres, in France, where he is thrashing Indian corn and raising water by the action of the sun's rays.

Mr. George Wells, foreman of the Hamilton, N. Y., steam bakery has invented a loaf of bread that does not require cutting after it is baked. It is made in the shape of Vienna bread and so constructed and evenly placed together as to form layers or slices of uniform thickness, and by pulling gently on each layer it peels off thus avoiding the use of a knife.

A new form of boiler lagging has been patented by Edward Krahenbehl, Allegheny, Pa. It consists of layers of papers or paper pulp formed into a corrugated sheet with a lining of asbestos to bear on the hot surface. The intention is to make air spaces between the boiler and the lagging, and yet have a strong covering which will prevent the radiation of heat.

The latest novelty in Sweden is an enormous engine which daily produces 1,000,000 boxes of matches. It receives the raw material (blocks of wood) at one end and gives up at the other the matches neatly arranged in their boxes, ready to be packed. The wood, which, in the course of last summer, was brought over to Jonkopin to be made into matches, filled twenty steamers and eight sailing vessels.

A new kind of vertical steam boiler has been invented by Mr. Armer. The object of the design is to obtain the greatest possible efficiency in the steam-heating surfaces. In order to effect this the tubes have a helical twist given them, which does not interfere with the ease with which they may be cleansed, but which causes greater impingement of the gases against the tube walls, and gives more freedom for expansion than straight tubes.

An artificial leather, mixed with 5 to 10 per cent. of sinew, and pressed into sheets like ordinary leather card-board, has been recently made in Germany. Both materials are made separately. The leather pieces are washed, cut, boiled in alkaline lye, torn, neutralized with hydrochloric acid, and finally carefully washed once more to remove all traces of acid. The sinews are treated similarly but steamed in an acid bath until they are like glue. When the materials are thus prepared they are mixed, pressed into sheets, moistened on both sides with a concentrated solution of alum and the upper surface is at last given a thin coat of caoutchouc in solution with carbon bisulphide.

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STEAM CATECHISM—IV.

ROBERT GRIMSHAW.

How early may a slide-valve cut off, and why?

The ordinary D-valve cannot cut off earlier than $\frac{1}{8}$ stroke without cramping the exhaust, and $\frac{1}{4}$ is a more common point.

What is the maximum grade of expansion with an ordinary slide-valve engine?

The maximum grade of expansion, allowing the cut off to be at $\frac{1}{8}$ —.625 stroke, would be $\frac{1}{8}$ =1.6, without clearance; and allowing 5 per cent. for clearance at each end, this is reduced to

$$\frac{1+.05}{.625+.05}=1.5555$$

How late can the Corliss type of automatic engines cut off?

Some of the Corliss types cannot cut off later than $\frac{3}{8}$; others as late as $\frac{1}{2}$.

Why is it that few automatic engines can cut off later than $\frac{1}{2}$?

As a general thing automatic engines have a fixed cut off at some definite point, and if earlier cut off be desired it is effected by an auxiliary (or special cut off) valve, or by a device which closes the admission earlier than the regular positive motion would effect it. In some engines (having only a single eccentric releasing gear) the governor can control the time of release only during the opening of the valve (necessarily during the first half of the stroke) and if the cut off is not effected before mid-stroke it will not occur at all during that stroke.

Why are high steam pressures advantageous?

High steam pressures are advantageous because the proportion of heat required to raise water to steam at atmospheric pressure, compared with that required to bring it to working pressure, is less with high than with low pressures.

When the steam is expanded below the atmospheric pressure in a non-condensing engine what is the result?

When the steam is exhausted below the atmospheric pressure in a non-condensing engine there is a return of steam from the exhaust passages into the cylinder.

The following table gives the mean total pressures with eight different actual expansion rates, and an initial pressure ranging from 25 to 140 pounds per square inch, reckoning above vacuum.

MEAN TOTAL PRESSURES OF EXPANSION OF STEAM.

Initial pressure above vacuum.	ACTUAL EXPANSION RATES.							
	1.333	1.5	1.625	2	2.666	3	4	8
25	24.130	23.481	22.938	21.164	18.567	17.488	14.913	9.6232
30	28.956	28.100	27.524	25.396	22.280	20.986	17.897	11.548
35	33.782	32.724	32.110	29.630	25.992	24.484	20.880	13.472
40	38.608	37.468	36.700	33.862	29.706	27.982	23.862	15.397
45	43.434	42.215	41.288	38.095	33.420	31.479	26.844	17.321
50	48.260	46.835	45.875	42.328	37.133	34.977	29.828	19.246
55	53.088	51.518	50.462	46.561	40.846	38.474	32.811	21.170
60	57.914	56.202	55.050	50.794	44.559	41.972	35.794	23.095
65	62.740	60.885	59.637	55.027	48.273	45.470	38.777	25.020
70	67.566	65.569	64.225	59.260	51.986	48.967	41.760	26.944
75	72.393	70.252	68.812	63.493	55.700	52.465	44.743	28.869
80	77.219	74.936	73.400	67.726	59.413	55.963	47.726	30.794
85	82.042	79.619	77.987	71.959	63.126	59.461	50.709	32.718
90	86.866	84.303	82.574	76.192	66.840	62.958	53.692	34.643
95	91.690	89.086	87.163	80.425	70.553	66.456	56.675	36.568
100	96.524	93.670	91.750	84.657	74.267	69.954	59.657	38.493
105	101.35	98.353	96.337	88.890	77.981	73.451	62.640	40.417
110	106.17	103.04	100.92	93.123	81.694	76.949	65.622	42.342
115	111.00	107.72	105.51	97.356	85.407	80.447	68.606	44.267
120	115.83	112.40	110.10	101.59	89.121	83.944	71.589	46.191
125	120.65	117.08	114.68	105.82	92.834	87.442	74.572	48.116
130	125.48	121.77	119.27	110.05	96.548	90.940	77.555	50.041
135	130.30	126.45	123.86	114.28	100.26	94.437	80.528	51.966
140	135.13	131.13	128.45	118.52	103.97	97.935	83.520	53.890

The following table gives the mean total pressures at four different grades of expansion, for initial pressures varying from 5 pounds to 100 pounds

per square inch, counting from absolute zero or vacuum.

MEAN TOTAL PRESSURES OF EXPANDING STEAM.

Absolute initial pressure.	R—GRADE OF EXPANSION.							
	$\frac{1}{8}$ Cut off.	$\frac{1}{4}$ Cut off.	$\frac{3}{8}$ Cut off.	1-5 Cut off.	$\frac{1}{8}$ Cut off.	$\frac{1}{4}$ Cut off.	$\frac{3}{8}$ Cut off.	1-5 Cut off.
	Clear- ance. R=1.56 Hyp. log. .4447 Factor .846	Clear- ance. R=3.78 Hyp. log. 1.3297 Factor .562	Clear- ance. R=1.81 Hyp. log. .2700 Factor .902	Clear- ance. R=3.96 Hyp. log. 1.3762 Factor 405				
5	4.320	2.810	4.510	2.025				
10	8.640	5.620	9.020	4.050				
15	12.960	8.430	13.530	6.075				
20	17.280	11.240	18.040	8.100				
25	21.600	14.050	22.550	10.125				
30	25.920	16.860	27.060	12.150				
35	30.240	19.670	31.570	14.175				
40	34.560	22.480	36.080	16.200				
45	38.880	25.290	40.590	18.225				
50	43.200	28.100	45.100	20.250				
55	47.520	30.910	49.610	22.275				
60	51.840	33.720	54.120	24.300				
64.7	55.900	36.361	58.359	26.203				
65	56.160	36.530	58.630	26.325				
70	60.480	39.340	63.140	28.350				
75	64.800	42.150	67.650	30.375				
80	69.120	44.960	72.160	32.400				
85	73.440	47.770	76.670	34.425				
89.7	77.500	50.411	80.909	36.328				
90	77.760	50.580	81.180	36.450				
94.7	81.820	54.121	85.419	38.353				
95	82.080	54.390	85.690	38.475				
100	86.400	56.200	90.200	40.500				

What are the objections to very high initial pressure and early cut off?

The objections to very high initial pressure and early cut off are the shock upon the moving parts, the decomposition of lubricants, increased leakage and larger cost for cylinder, framing and foundation.

Which are the more economical of steam, large or small engines?

For the same proportionate load large engines are the most economical. Thus, a 100-horse engine, cutting off at $\frac{1}{4}$, could be more economical of steam than two fifties (50's) with the same expansion rates and general design.

In a non-condensing engine how many we get the best economy with a given boiler pressure?

We may get out of a non-condensing engine the best possible duty with a given boiler pressure by keeping the full pressure clear up to the point of cut off, and expanding down nearly to the atmospheric pressure, (supposing free exhaust and admission, and minimum clearance, friction, leakage and condensation.)

What are the results of too light loads?

The results of two light loads (or too large engines) are excessive internal condensation and in some cases expansion below the atmospheric pressure, making a vacuum on what should be the working side of the piston, and dragging on the fly-wheel.

When is the best economy attained?

The best economy is considered by most engineers to be attained "when the mean effective pressure is highest relatively to the terminal pressure."

What is the exact measure of the work done by an engine?

The exact measure of the work done is the mean effective pressure.

What is the measure of the steam consumption of the engine?

The steam consumption may be measured by the terminal pressure.

What is the effect of early exhaust closure on steam consumption?

Early exhaust closure saves steam.

What is the effect of exhausting from the clearance at a pressure greater than the back pressure?

Exhausting from the clearance at a pressure greater than the back pressure wastes steam.

How is the economy of a steam engine expressed?

The "economy" or "duty" of a steam engine ought to be expressed in pounds of water consumed

per hour per horse power, and not in pounds of coal.

Why should the economy be expressed in pounds of steam (or water) rather than in pounds of fuel per hour per horse power?

The amount of coal or other fuel per hour used to generate steam for an engine of any stated horse power depends on conditions entirely independent of the engine which uses the steam; such, for instance, as the kind, size, proportions and condition of boiler, the way it is set and fired, the kind and temperature of the feed water, the draft, the kind of fuel, the dryness of the steam, etc.

Which are the most economical, high or low initial cylinder pressures, and why?

High pressures are the most economical, because the proportion of lost heat and pressure in the exhaust to the total pressure is less.

What are the advantages of dry steam?

Water in the steam not only lessens the capacity and duty of the engine, but is dangerous to the cylinder heads.

People Without Bread.

This heading does not indicate starving people says the *Gartenlaube*, but those who have plenty to eat, although without—bread. To us, and the people in other centers of civilization, this may appear strange, and may lead readers to believe we are going to relate something about a people in far of Asia—but this is a mistake. These people without bread are those of South Austria, Italy and Roumania. It is evident that this "without bread" is applicable only to the large classes of the people of these countries, not to the better situated societies and large cities.

Within a few miles of Vienna, in the mountain of Upper Styria, very little bread is eaten in the villages, while in many of the country towns none is eaten at all. The principal daily food of these people is the so-called *Sterz*, which is made from buckwheat flour. The buckwheat, called *Heiden* in Austria, grows exceedingly well in the mountain valleys of Styria, Ukraine and a part of the Tyrol.

The preparation of the *Sterz* is as follows: The buckwheat flour is placed in a deep dish and the heated over the fire, under continuous stirring with a wooden spoon, until it is warm. Then some hot water is added, while the stirring continues; the addition of water is repeated until, in combination with the water, the flour forms a lumpy mass. As soon as the whole mass in the pan begins to steam strongly the cooking is finished. In the household of the country people, the *Sterz* is eaten for breakfast mixed with fresh milk, in summer with soured milk; for dinner it is eaten with soup or roasted bacon, and in the evening again with milk. With this very nourishing material the inhabitants of the Alpine countries rarely or never have a desire for bread. Even in the better households in the cities the *Sterz* is a favorite dish, and consequently the national food of a large section of South Austria.

In the neighboring countries of Italy, the people eat very little bread, but so much more *Polenta*. The preparation of this is very much like that of *Sterz*, only in making *Polenta* maize flour is used of which the Lombardian is considered the most excellent. The *Polenta* is not stirred to a lump mass, but is formed into large cakes, which are cut with a wire or string. The ordinary Italian eats his *Polenta* cold instead of bread; on the table of the better class it has a finer appearance.

The Roumanians, finally, who are either the remnants of a large Roman colony, or Romanized slaves, have a national dish which is very much like the *Polenta*; it is also prepared from maize flour and called *Mamalgina*. It is not, however, eaten like the *Polenta*, in the form of a cake, but as a paste—*Aug. Mull. Ztg.*

A NEW WHEAT CLEANING MACHINE.

THESE are impurities attached to, and part of, the wheat which can only be removed without deteriorating the flour by the best adapted wheat-cleaning machinery. During all these years of improvements in milling little or nothing has been done in the direction of the better cleaning of the wheat. It has been behind all other milling improvements. On this page we present an illustration of a combined cleaning machine just introduced for the favorable consideration of millers, which seems to meet all the requirements. It is called the Teetor Combined Scourer, Polisher and Brush, and the claims set forth in its behalf by the manufacturers, Messrs. C. H. Walcott & Co., of Indianapolis, Ind., are:

First. It was recognized that there was no cause which led to the production of more ashy, dirty, specky-looking flour, than the improper and incomplete cleaning of the grain previous to its reduction.

Second. It was noticed, on examination, that the outer coatings of the bran were composed of thin layers, which were easily removable, and which would not detach or disturb the more elastic and tougher coatings of the interior. In addition to the thin outer-coating were the vegetable hairs, at the end of the berry, as well as the crease impurities.

Third. It was observed that the usual methods employed in these machines for removing these impurities, were of such a character as to make little more than a pretense of removing them, while there arose others whose efficiency is entirely destroyed, owing to the severity of their action, the grain being bruised and broken, and the bran scratched and lacerated, the wheat being fractured previous to its reduction, and the bran being rendered small and brittle to such an extent as to render its separation from the flour and middlings a matter of impossibility. Furthermore, this disturbed condition of the wheat has the effect of lessening the production of middlings, and deteriorating their quality, as well as increasing the quantity of break-flour, proportionately destroying its value.

Fourth. It was surmised that a machine which would first scour the wheat in a way to remove the impurities mentioned, and, at the same time, leave it with a smooth polished surface, without scar or fracture, would be a marked improvement upon the usual methods.

In this machine these conditions are met, and the foreign substances are separated from the wheat, which, as it leaves the machine, is found to be uniformly smooth and glossy, with round, fiberless ends and clean crease. The chaff, dust and fiber are all removed. This machine is a combined scourer and brush, not in the sense that the scourer and brush are in the same jacket, as is the case with a number of so-called combined machines, but they are separated, each performing its own work in turn. The wheat first enters the scourer, the action of which is to remove all of the outer impurities mentioned by rubbing one grain against the other in a manner to most thoroughly accomplish the desired result. This is a method used in the best Hungarian mills, which clean their wheat to a degree of perfection never before accomplished in this country.

This scourer has its own suction-chamber, following which is the brush-machine, which is the most perfect one of its kind yet devised. The impurities liberated by its action are carried away by a dis-

inct and separate air-current. It is difficult to describe the quality of the work of a machine on paper. The above statements of excellence and perfection of operation are made by the manufacturers in all sincerity, and with the knowledge that an investigation will bear out all that is claimed for this machine. Millers desiring a more detailed description of the machine, and information respecting its cost and manner of operation are requested to correspond with the manufacturers, whose address is given above.

The Origin of the Potato.

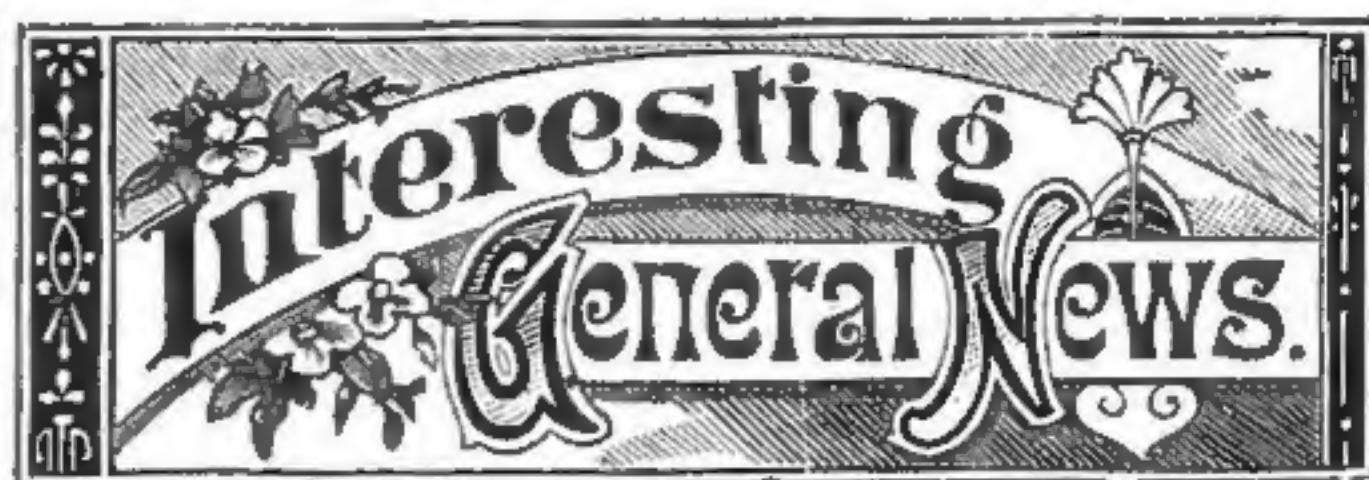
The potato, originally a South American plant, was introduced to Virginia by Sir John Harvey in 1629, though it was unknown in some counties of England 150 years later. In Pennsylvania potatoes were mentioned soon after the advent of the Quakers; they were not among New York products in 1695, but in 1775 we are told of 11,000 bushels grown on one 16-acre patch in this province. Potatoes were served, perhaps as an exotic rarity, at a



Harvard installation dinner in 1707; but the plant was only brought into culture in New England at the arrival of the Presbyterian immigrants from Ireland in 1718. Five bushels were accounted a large crop of potatoes for a Connecticut farmer; for it was held that, if a man ate them every day, he could not live beyond seven years.—*The Century*.

Peregrinating Pebbles.

The curious traveling stones of Australia are paralleled in Nevada. They are described as almost perfectly round, about as large as a walnut, and of an ivory nature. When distributed about upon the floor, table or level surface, within two or three feet of each other, they immediately begin to travel toward a common center, and there lie huddled up like a lot of eggs in a nest. A single stone removed to a distance of three and a half feet, upon being released returns to the heap, but if taken away four or five feet, remains motionless. They are composed of magnetic iron ore.



More than 18,000 homesteads have been entered in Florida during the year.

In 1882 Arizona produced 17,000,000 pounds of copper. During 1883, the increase has been 38 per cent., and new furnaces are being erected. The output from Arizona for this year will probably be not less than 25,000,000 pounds.

Belgium was the first country on the continent to construct railways. State fetes are now being prepared to celebrate, on the first of next May, the fiftieth anniversary of the day when the construction of Belgian railway was first decreed.

An Illinois philanthropist wishes to benefit the poor by teaching them to eat their bread and butter with the butter side down. He says that the sense of taste is most acute on the tongue, and that a very small amount of butter is satisfactory, if put in the obviously right spot.

Taking the entire South we find that it contains 351,717,691 acres, or more than half of the area of the Union. Of this enormous territory, 259,959,159 acres yet await improvement. A very large proportion of it is capable of profitable cultivation, or covers inexhaustible mines of mineral wealth.

There is talk of bridging the Mississippi at New Orleans, where the river is 2,400 feet wide. An engineer proposes seven spans of 300 feet each, one to be a draw. The piers are to be creosote piles, driven in clusters, and heavily capped and cased with iron. The depth of the water will be no obstacle, as the piers can be spliced. The estimated cost is \$13,000,000.

The manufacture of perfumeries from Florida-grown flowers bids fair to become an extensive industry in that state. One firm at Jacksonville is already at work. It is reported that a gentleman from South Florida has patented a process for the utilization of the bloom of the mangrove and sapodilla, and to extract the sweet fragrance from the cassava plant as well.

Several accurate photographs of lightning flashes have been secured by Mons. Robert Haensel, of Reichenberg, Bohemia. The flashes are shown as long, continuous sparks, and in one of the pictures the point where the spark met the earth may be seen. The landscape is clearly defined in the photographs, affording a means for calculating the length of the lightning's path through the air, which, in one instance, was estimated at more than a mile.

The mountains of Gellivara, in the most northern part of Sweden, consist of pure magnetic iron in immense layers of several hundred feet thickness upon the surface of the ground. One of the peaks alone is supposed to contain 280,000,000 tons. They are situated near large forests furnishing fuel, and are less than a hundred miles from the Atlantic. It is intended to build a railroad around the mountains to a port, Ofoten, on the coast, and it is estimated that the iron ore can be delivered on the cars at the low price of two shillings per ton.

[For The Millstone.]

SMOKE-BURNING STEAM-GENERATING FURNACES.

J. F. TALLANT.

IN badly fired furnaces the vast volumes of smoke and soot which fly from the tops of the smoke-stacks really represents so much actually wasted fuel, which has probably been transported many miles from the mines by rail, hauled by wagon to the mills, and shoveled into the ever wide-agape furnaces, from thence to defile and disfigure the atmosphere and all surrounding buildings. After paying roundly in cash for all this a large percentage of the fuel is thrown away, destroyed but unconsumed, into the open air.

To feed soft coal into a furnace to the best advantage the adjustments should all be so made that when enough coal is shoveled into the furnace to keep the steam at the requisite pressure to do the required labor, little or no smoke shall emerge from the stack. This will always be the case when the firing is skillfully and carefully done, so that enough coal to do the work and no more is used. It is equally wasteful to have too strong a draft in the furnace. If too much air is used the portion that is not needed takes a part of the fuel to heat it, and this is always a waste. Cold air, admitted in front of a furnace, always uses a large part of the fuel in being sufficiently heated to pass through the fire-box with the necessary velocity. Just enough air, with its due proportion of oxygen, should be used and no more. If this could by any means be heated from the waste heat, the hotter the better, a very great gain in the generation of steam would be perceptible.

Of late years several devices of hot air smoke burners have been introduced that are of very great value, though as yet they are by no means so popular or so generally introduced as their great merit ought to make them. These machines are generally located at the side of the furnace, mid-way, outside of the bridge-wall in the rear of the fire-box. Being permanently secured there, hollow pipes or tubes at the side of the fire-box or at the base of the smoke-stack, as may be most convenient; communicate with the machine, which is set in motion by opening a steam jet from the boiler, which, though very small and requiring very little steam, causes a rush of hot air into the space back of the fire-box, where the products of combustion usually meet with very little air to consume them. But by setting in motion the smoke burner a body of hot air mingled with steam is injected into the furnace with considerable force, and the whole forms a most intense heat just where it is most needed, about midway of the boiler, completely consuming all smoke, soot, carbonic oxide and other gases such as are usually wasted entirely by throwing them into the atmosphere to defile and contaminate it and inconvenience those who are compelled to live in such an air. The result in every case noted by the writer has been satisfactory in the extreme.

Another modification of the same device furnishes not only hot air and steam, but also hydro-carbon gas from crude petroleum. The result is a truly intense and luminous heat, completely consuming all that is too often allowed to go to waste unburned, and vastly saving in handling fuel, cleaning grate bars, and the usual heavy work of this sort, besides a very great saving in fuel, unusual steadiness in keeping up steam and consequent greatly increased amount of labor or duty performed by the engine. The following is a report of the performance of a coal oil smoke-burning furnace at the Paris (France) water works:

Eleven days' work done by the apparatus. Kilogrammes of coal burned, 40,550; revolutions, 522,406; piston per kilo. 12.88

Eleven days' work without the apparatus: kilos. of coal, 44,350; revolutions, 519,034; piston per kilo., 11.70
This device saved 3,800 kilogrammes of coal on one boiler

in 11 days, or 345 kilos. per day, a saving of 18 per cent. This saving was equal to 4,216 francs a year (or \$843.00) with coal costing 34 francs a ton. The increased number of revolutions made was due to the steady steam pressure which the machine insures. There is absolutely no smoke whatever to be seen issuing from the chimney when the apparatus is employed.

While this may be the case, it is very seldom that the engineers in charge of any such machine manage it with care enough to absolutely insure such a result all the time. There is nearly always a little smoke to be seen but much less than usual, and the shutting off or discontinuance of using of the device always causes the smoke to pour forth in its usual dense black volumes. How soon smoke burners will be generally adopted and brought into full and general use it is hard, nay impossible to say. But that city authorities should compel their adoption by steam users generally is very certain, especially as this would greatly benefit not only the public but the steam users themselves. There is very little doubt but that by the general use of one of these cheap and very simple devices a saving of fully 10 per cent. in the consumption of fuel would be assured, even in the hands of the least skillful, with a very great addition to the comfort of the public, especially in large cities like those of the West.

A very cheap modification of a fuel saver that is a partial smoke burner, and is not patented either, that the writer is aware of, may be made by inserting cast iron 3-inch pipes into the furnace walls each side of the fire-box and opening directly above the fire where steam is being generated. A small blower, drawing the air already partially heated from the base of the smoke-stack and the rear of the furnace through other cast-iron pipes, forces the air through the fire-box pipes and projects it directly on the burning fuel, the front doors being kept tightly closed except for occasionally feeding the furnaces. The effect is remarkable. The heat is steady, the air furnishing a dull, ruddy glow just where it is wanted, on top of the fuel near the boiler and dot, as usual, on the grate bars under the fuel bars, where it can do no good except to burn out the grate bars. There is nothing of the usual constant stoking, punching and grate trimming necessary. The principal care is to keep fuel enough and not too much to keep the steam at its regular height. The labors of the fireman are lessened fully one-half, while the consumption of fuel is far less than when cold air alone is freely admitted, as usual, without any regulation.

There are many of these devices that might be used greatly to the advantage of millers and other steam users that cost very little money to start at first and to keep up afterwards. In fact, it is surprising that so few are to be found in use when the merits of all are so great.

Extent of the Dominion.

Canada with its 3,406,542 square miles of territory, as shown in a recent return published in these columns, is much larger than the United States. From the report of Mr. Gunnett, geographer of the United States census, we learn that the total area of the United States, Alaska excepted; is 2,970,000 square miles. The total water surface, including rivers and small streams, lakes and ponds, is 55,000 square miles. The coast waters, bays, gulfs, sounds and the like, cover 17,200 square miles. The following table shows that the Dominion is second in extent to Russia alone among the countries named:

	Square miles.
Austria Hungary...	226,406
France.....	201,900
Germany.....	210,081
Great Britain and Ireland.....	121,260
Italy.....	112,617
Russian Empire.....	8,404,767
Spain.....	182,738
Sweden.....	170,680
United States.....	3,025,000
Canada.....	3,406,542

—Merchant and Manufacturer.

Flour Milling in India.

A Calcutta correspondent in the *Mark Lane Express* communicates the following:

Less than a quarter of a century since saw the erection of the first corn mill in India. Even now the corn of the great city of Calcutta is ground by bullock-power mills, or by hand. In my walks through the city I have repeatedly seen women "grinding at the mill," as mentioned in the Scriptures. Bombay is more Europeanized than Calcutta, and it has a flour mill on a large scale; but even here women may be seen employed in grinding the daily allowance of corn for a family or group of families.

At first sight one might regard this adherence to old ways as the result of an antiquated prejudice against mechanical innovation. This is not the case or the whole case. We must look a little deeper for the real reason why women sit at the mill as they did three thousand years ago. At the bottom of this amazing piece of conservatism lies that religious feeling, prejudice or what you may please to call it—caste. This enters into every movement of the daily life of the people, and into nothing more completely than in the preparation of food. They will only eat and drink from their own vessels, and these must be scoured after each meal. They will only eat food that has been prepared by one of their own caste, and in some cases pollution ensues if even the shadow of a person of different caste falls upon the food after being prepared. Obviously, such people will not use flour which has been made in a mill where all sorts of persons are employed, and where a good many evil shadows may be expected to cross the product. It is equally certain that people who entertain such prejudices are not likely to be talked out of them.

The government of India is wise in its determination not to attempt to wean the people of India from their old faiths, or even their antiquated prejudices. But it is very instructive, and suggestive withal, to observe how caste prejudices give way before convenience. The late Mr. Bapty, who built the first steam flour mill in India, must have trusted partly to this, as well as to the fact that he had a European population and large numbers of natives who have no caste to be his customers. The convenience of being able to purchase a pound of flour instead of grinding it in the shanty which serves the poorer natives as a house must be too strong to be resisted by all but the pedantic and frantic upholders of caste. At all events, Bapty's flour mill not only succeeded, but there are now several smaller steam flour mills in Bombay under native management. The railways, again, illustrate the same point. Men of superior caste ought not touch those of the lower grades; but there they are in a railway carriage huddled together, as railway passengers are all the world over, and not without strong suspicion, when the Bheestic comes round at the station, of drinking unclean water.

When the tramways were first proposed in Bombay and Calcutta, people who knew India well, declared that the projects could not succeed. The Europeans would not ride with natives, and people of different castes would require separate cars or compartments, it was said. As a matter of fact and experience, I may say that Europeans and natives and men of different castes manage to get along very well, for the cars in both cities are well filled, and the tramways are among the best paying enterprises of India. The inference I draw is that the people of India are much more open to teaching by example than they are to persuasive precept. Bapty did not argue the point; he built his mill and supplied good and cheap flour. The railway companies furnished good and rapid communication between distant places as the tramways did for shorter distances. Between them they have done much to educate the people of India, and the lesson is always going on.

[For The Millstone.]

MILL ARCHITECTURE--I.

THE sight of plans or formulated methods for building are calculated to carry the idea of increased expense. It is clear that the plans, in themselves, can have nothing to do with the cost. It is entirely possible to make plans and specifications which will anticipate the entire expense of building. That is, the full cost is shown at once to him who proposes to build. But when no plans are prepared no estimate of the cost of completing a building can be made. An approximate understanding may be arrived at, but a full calculation as to the quantities of material and labor cannot be reached without plans and specifications in full. For this reason incomplete plans are little better than none at all. With such plans, or no plans, the first idea of cost is deceiving, as it is invariably low, but having once got a start the whole cost has to be borne. Accurately prepared plans and specifications are the only means of getting a first-class building—one which is adapted to its wants in all respects, one in which is anticipated the use to which it is to be put. Furthermore, such means are the ones which lead to the most economical results. It is by means of plans and specifications that a competition as to the labor and material involved may be brought about. It is competition which develops the lowest cost of construction. This advantage to the

gests to the mind of the contractor the necessity for close management and skillful handling of the labor and material at his command. It prompts economy in the use of labor and material.

As to the appearance of a mill building the question of beauty and grace of outline rarely receives



FRONT ELEVATION.

attention, and for what reason? First, because the mill building is frequently regarded as being one the artistic development of which is out of the question; and second, anything which is not positively homely is generally regarded as being less expensive than a building which has grace of outline and exactness of proportions to recommend it. It is fair to affirm that a building of the ungainly character which is by no means uncommon with mill buildings, may contain as much material and labor as those which have a better appearance, and as labor and material is about all there is in a building, the question of appearance has nothing whatever to do with cost only in so far as the quantity of such commodities is affected. The question of neatness and grace of outline is one of wit rather than of money.

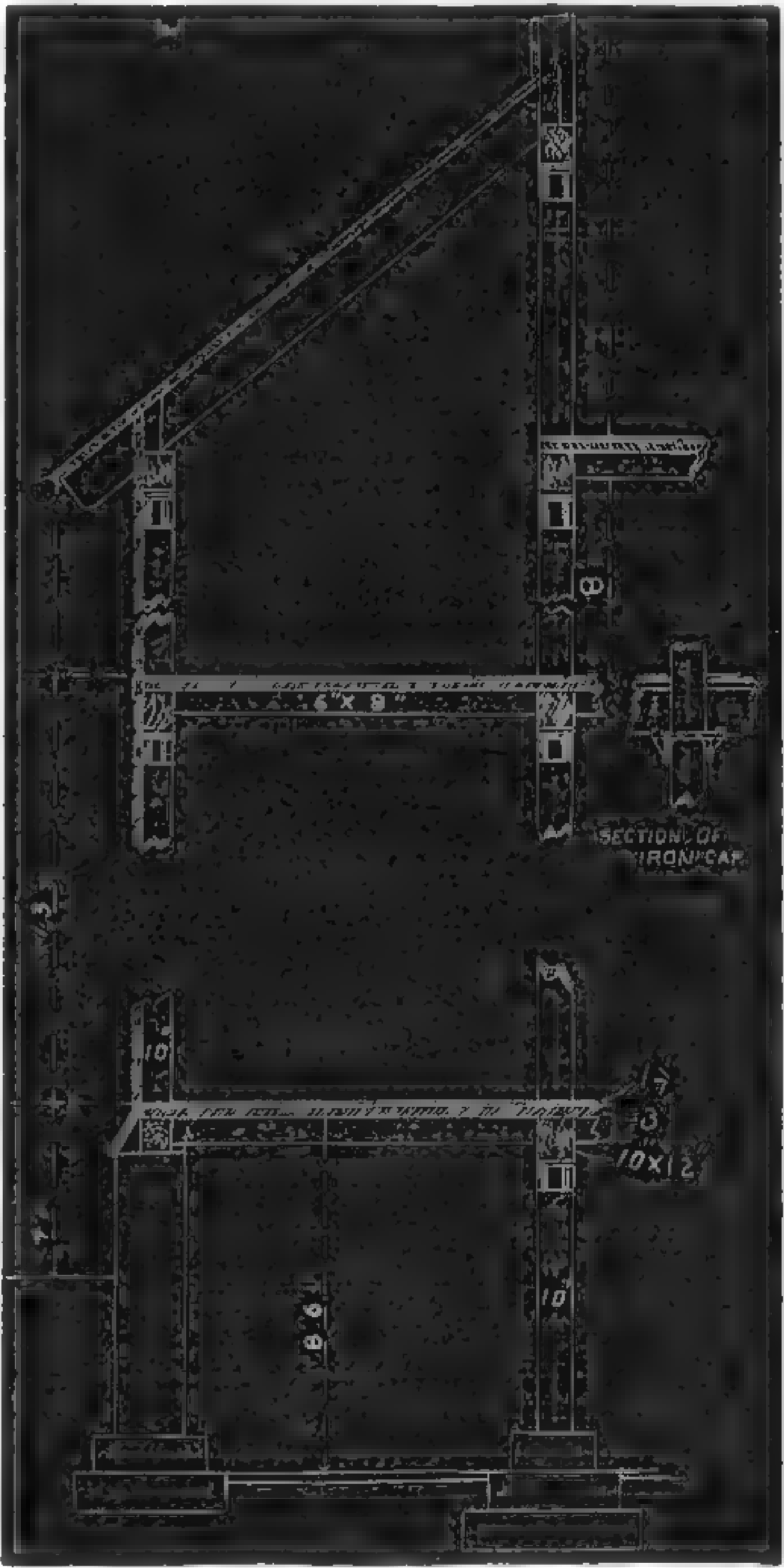
The plans and elevation which are herewith presented are of a frame building of a size indicated in the floor plan. There is a brick boiler and engine house in the rear, which is separated from the main building by a brick wall. In the front end will be noticed a stairway going above from one end and below from another. It will be seen that the building is three stories in height with a cupola on top extending the full length of the building, in which the elevators may be turned and other machinery arranged. Below is a basement which is of ample height and well lighted. In it should be placed the line shafting, the elevator boots, but no wheat-cleaning machinery or any other machinery.

In the rear left-hand corner of the plan will be noticed an extra number of posts. It is above these that the wheat bins may be placed. A peculiarity of the arrangement of the floor is that the spaces between the posts and girders, or, as they may be called, the bays, is not the same in all directions, as is usual, but quite the reverse. Lengthways of the building the space between posts is 17 feet; crossways it is 8 feet. This is better than the usual way of having the bays in 12-foot squares. While it is possible to put two sets of rolls side and side in a 12-foot bay, it is not possible to get more than one line

in that space, while by the 8x17-foot bays three sets of 9x18 rolls may be placed side and side in single line, one for each 8 feet, there being an alleyway between the lines and a passage-way around each third machine.

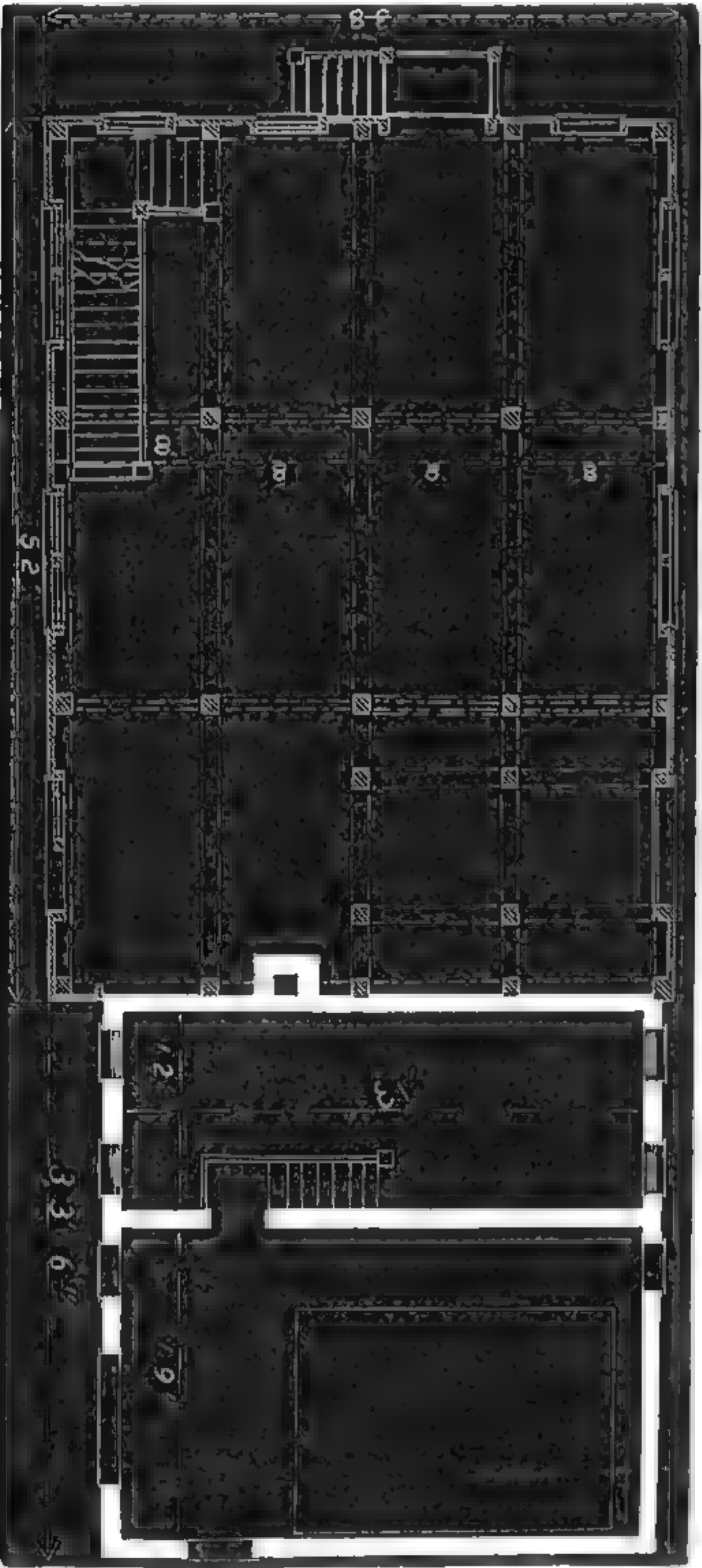
The ordinary weather-boarded frame mill is an unpleasant place to work in in cold weather, so unpleasant indeed that service in such an one amounts to punishment, and for which reason the help do not appear to advantage or do their best work. The extremes in temperature do not admit of work being uniformly done for well-known mechanical reasons. The outside covering to this mill is in a degree calculated to overcome these difficulties. Instead of employing studding for the outside walls, posts only are used, spaced as indicated, one for each corner, one for each bay, and one for either side of each window, the latter posts being lighter than the others. The space from post to post is covered with two-inch stuff dressed, which would then be 1 1/4 inches thick. The section shows how these boards are arranged to lap joints and throw off the water. Each piece is rebated on the bottom edge in a way to receive a tongue or lip from the top edge of the next board.

The details of construction are quite dissimilar from ordinary methods. Instead of having joist set on edge from girder to girder three-inch plank are laid flatways in the direction of the eight-foot



CROSS SECTION.

span. These planks have rebated joints at their edges and the whole is covered with the ordinary 3/8-inch hardwood flooring, maple being preferred. This style of construction has its advantages in resisting fire, no edges of timber being exposed as is usual with joist, and on the other hand thick surfaces are offered to resist the action of fire. This style building is known as slow-burning construction. There are other details of equal interest to those above which will be described in the next paper on this subject, which will include an estimate of cost.



FLOOR PLAN.

owner is not gained at the expense of the contractor, as the latter is fully informed by plans of the kind mentioned as to all the requirements of the building. By such means and none other can he make an accurate bill of quantities. Competition also sug-



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We desire a local correspondent in all the milling centers of this country and Europe.

We will pay a liberal price for original articles on milling, mechanical or scientific subjects, forwarded to and accepted by us. No manuscript returned.

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In view of possible litigation with the owners of the Roberts patent for purifying break meal we present in this issue a full description of the patent claims and illustrations of each feature of the invention. We think it worth the space given to it at this time, notwithstanding the little faith we have in the merits of the claims set forth so earnestly by those in charge of the patent.

THE Geo. T. Smith Middlings Purifier Co., have adopted the Nordyke & Marmon Co.'s roller mills in their new Canadian mill building business.

A COMPILATION from the census report of manufactures shows that the aggregate of motive power for flour, grist and saw mills is half of the total amount of all manufactures enumerated.

KELLOGG, of the *Roller Mill*, says "it doesn't necessarily follow because a girl is red-haired her father worked in a carmine factory, or a tannery." No, of course not, neither does it follow because Kellogg has hair of the color of a boiled crab that his daddy was a fishmonger.

WE expect that \$1,000 prize for the best bran packer will be awarded at the forthcoming convention of the National Association—that is, the formality of bestowing the award will very likely be gone through with. We venture the assertion that the \$1,000 will represent a greater value to the successful competitor than the profits on the machines he sells to millers.

THE *Miller's Gazette*, of London thinks it very strange that wheat heaters are not advertised for sale in England, where a process for drying the damp wheats used there is so manifestly desirable. Assuming that where not advertised there is little demand for them, here is an item that may direct the enterprise of the makers of some of these numerous valuable devices in use on this side to a field for enlarging their trade. The *Gazette* and *Miller*, both good journals, would doubtless quote our manufacturers reasonable advertising rates.

THE Dominion Millers' Association has settled with the Consolidated Middlings Purifier Co., owners of the Smith Purifier patents, on the basis of \$80 per machine. This action has caused a regular blizzard of indignation among the outsiders and the manufacturers who sold them infringing machines and then left them to the mercy of a merciless corporation. The Geo. T. Smith Co., now in Canada doing business, and whose rule it is to back up their customers in the use of anything they sell, will be apt to take the lion's share of the Canadian business from this time on.

It is said that we of this country cannot produce wheat and sell it as cheaply in Europe as India, Russia and other wheat producing countries that have recently made such inroads on our foreign business. In the abstract that is true. We will have to sell it, if sold at all, at the prices dictated by the supply from other countries. The cost of our production, however, has nothing whatever to do with its selling price. As everybody knows the price of our wheat is fixed by the price of the surplus. The price of the surplus is fixed by the general supply to consumers abroad.

FROM foreign sources we learn that the present depression in our export grain trade is not owing to the competition of East India alone, and as a matter of fact Indian wheat has cut a small figure in the general lowering of prices. There is a temporary glut of all kinds of wheat in English ports, except American, which accounts for the dryness of the pudding. We are gratified over the fact, if fact it is. The ghost of Indian competition has recently been the great hair-raiser among our farmers and boards of trade, and if, as our authority further states, it has not shown this season as terrifying an aspect as on former occasions, we can still have hope for the future. It might just as well be remembered, however, that the shadow has much the form of a healthy substance, and will bear watching. Does our Congress see it as a palpable thing, or only as a nightmare?

TALK about business gloom and general dullness of trade is very unpleasant to say the least. Commercial writers, as a class, are inclined to look on the bright side of business matters. Their mental vision is generally so constructed that they can always see the bow of promise in the future. If business is dull this week or this month their tendency is to see indications of improvement for the next week or the next month, and so on, with hope deferred, and it is well that most of our minds are so ordered. If our miller friends could have seen or known from the first the months of drooping trade through which they were to pass, their experiences in the passage through this gloom would not have been tempered with the imaginary glimpses of brightness in the future. During the last few weeks there has been a general downward turn in produce of all kinds. To the man with a stock on hand this is not a hopeful sign. As a matter of fact there is more hope in it, more reason for pleasant anticipations in it, than anything that has happened in months, or in fact during the whole period of depression. With Western millers the talk has been that wheat was higher in the West than it was in the East, and as a fact it needs no confirmation. The reason for this is to be found in the fact that the East has been more in sympathy with the foreign markets, because of their direct and dependent relations therewith, than has the West. The price of wheat in the West has been the result of an illogical opinion as to what it was worth, and the question of worth being a question of demand and supply, its price could not be long sustained upon such a basis. Foreign supply and demand has dictated what our wheat is worth. Our opinion was that it was worth more, but in time an opinion always has to go down before a fact. As soon as we recognize distinctly that we have to sell our goods at the prices which other people are willing to pay for them, just then, and not before, are we making a market for our products. It is at such a time that we begin to emerge from the gloom. The recent heavy decline in the price of wheat is a healthful sign.

ONE of the principal events of milling interest during the last month has been the reduction in east-bound freights. The regular rate from Chicago to New York, as every one knows, was reduced 15 per cent., or 30 cents per barrel of flour. This reduction was to meet the cut of various freight lines which were members of the east-bound freight pool. As soon as their cuts were recognized, Commissioner Fink reduced the regular rate to meet the irregularities—that is the cutting—of those inside the pool. This is a new line of action, the purpose of which is to put an end to the cutting of rates, and upon its success hangs the life of the trunk line pool. If the pool is for any purpose it is to prevent the cutting of rates. This policy of making all low rates offered in an irregular way the regular rates of the pool is a bold experiment, and a costly one. It brings all the roads down to the same low basis, and it may be that the ghost of bankruptcy and receiverships, which is staring them in the face may develop in the minds of the managers of the various roads the necessity for regular and concerted action in the pool. The main purpose of the recent cuts was developed by dissatisfaction as to the apportionments: and for the purpose of securing a larger share of the next adjustment, freight was carried by the dissatisfied roads at less than cost. This gave them a showing of larger trainage than they would have acquired at the regular rates, and for the purpose of having their apportionment increased they were willing to suffer temporary loss in hope of securing larger future gains. A general public reduction of rates headed this thing off. At

present efforts are being made for a restoration of freights and it will not be surprising if early action should be taken in the matter.

WE hear many things said embodying ideas which, while they are not new to us as to the conclusions reached, the methods of expression, or the logic in reaching the conclusions may be new. We met a few days ago a gentleman whose position entitles him to a full knowledge of the methods and results of speculation. He said: "Outside a very small circle all speculation results in loss. In the first place when a man buys wheat in a speculative way, and puts up a margin, he pays its full market price and a commission besides. He starts in on the deal with a loss. Say again that he buys wheat, he buys it in anticipation of gain. His purchase is made in the belief of higher prices." Say it goes up a cent or two, he has made his gain and he sells. His opinion has been justified. Say it goes down, he still has the same opinion on which he originally based his purchase. He puts up his margins and holds on to it. Two, three, four, and five cents decline. He either puts up his margins again or loses the whole. The history of all speculation is that a dealer will hold on to his goods longer when they are going down than when they are going up. If the chances of advance and decline are equal, the general speculator will lose more than he will gain, because of this natural human instinct to trust in one's own opinions until stubborn facts compel a yielding. When one sells short he does it with a belief that it will go lower. If values advance he puts up his margins as long as he can hold on. If they decline in support of his judgment the general disposition is to furnish the goods at the first convenient opportunity. A man will back his judgment longer against adversity than he will under favoring circumstances."

THERE is very little of the ornate shown in the construction of mill houses, not near so much as most builders display on stables and outbuildings for instance. Whether this is because of the fact that until recently it had been impossible to preserve the mill building clean from the emitted dust of the mill itself, or that modern architects have not planned in this direction, it is certainly a matter mill owners have given little attention to. Now since the adoption of the dust catcher, and in gradual reduction mills the new process of flour manufacture, which has diminished the amount of dust created, there is no reason why more attention should not be given to improving and beautifying the exterior of the mill. A mill house of pretentious design, besides being an ornament to the town in which its located, is also a criterion of the good taste and enterprise of its owner. The man who has the money to spend on a residence erects it after modern architectural designs and details in all the beauty and convenience which his purse will permit, and has as much pride in its perspective as in its interior arrangement. It should be so with the mill. With this view we have in preparation a series of illustrated articles showing the elevations and interior construction of mills of various capacities. These articles will aim to describe plans of neat buildings adapted to every order of artistic finish which seems suited to the taste of the miller, and at the same time show an arrangement of the mill floors designed to place the working parts of the mill in the best form for easy and effective work. The first plan of the series is presented in this issue and fully described. We are prepared to furnish millers contemplating building with specifications of any of these mill plans that may strike their fancy, at a price merely covering the cost of preparing them.

THAT which is denominated the Voorhees patent bill, is in fact only an amendment to the bill introduced in the Senate last December by General Harrison, of this state. It is a good bill and ought to pass, while the numerous other bills and amendments introduced as efforts to make a patent law satisfactory to the country should be squelched, as every one of them is faulty and unjust. The Harrison bill is based on equity and calculated to serve the interests of the general public not directly interested in patents further than to be protected in the use of appliances which they have purchased in good faith. It declares that the penalty of infringement of any patent shall rest upon the maker and seller of the machine and not upon the innocent purchaser. A law is as much required to protect the purchaser of a machine for his own use, as a law to protect the inventor of such machine from the theft of manufacturers. If the fruits of an inventor's genius and labor is unjustly taken from him and offered for sale the seller and not the buyer for his own use, should pay the damage. Such a law is what the public demands and it will be content with nothing else. The greatest injustice in our patent code is that it now makes *bona fide* purchasers of machinery liable for damages for its use to such concerns as the Jebbs; if they can succeed in establishing the fact that their original invention has been infringed upon by unscrupulous vendors. Let the inventors and owners of inventions look to the manufacturer and dealer for damages under the law.

WHAT is the matter with the wheat market? It shows a decline of 20 cents from the quotations of corresponding dates of last year. The reason for this is to be found, not in speculation but is based on the old question of demand and supply which cannot be affected by speculation. We will have 80,000,000 bushels of wheat which has been left over to be added to the new crop, which is 14,000,000 more than was on hand at the same period in 1883. There are 460,000 quarters more wheat in store in London than at the same time last year—hence we have not the same chance of exporting our surplus that we had last year. The outlook for the new crop is good, the acreage large. Now here we have a larger surplus than last year which means more wheat to sell and fewer chances to sell it, hence low prices. South Australia, Victoria, India and Russia are growing wheat cheaper than we have been selling it, and notwithstanding our higher cost of living they fix the price on our wheat whenever they can supply the demand of the countries where we are in the habit of marketing our surplus. They are fast showing their ability to supply this demand. The talk about speculation running the price of wheat down is all nonsense. Men can speculate on the probable supply and demand. Their bets are settled by the facts of demand and supply.

THE Millers' National Association and its good right arm, the Milling Journalists' Association, will assemble in Chicago the latter part of June next to—talk! That's the all-embracing word. The millers will have considerable to talk about at this meeting, for the jugfull of topics open for discussion is a bulky one. As there has never been any reason why the journalists should not turn out in full quota at these gatherings, they will, of course, marshal in full strength on this occasion. It has come to pass in this connection, that the arm wields the body, as was so palpably manifest at the last convention, and such, being the case, the annual conventions must grow in interest. Neither miller nor journalist will be at loss for attendance at these gatherings. So let there be a large turn-out.

THE Wisconsin Millers' Association held a meeting at Milwaukee on the 8th inst. Secretary Seamans, in his report, noted the position of the National Association in reference to the several patents being considered by the executive committee, none of which give immediate cause of alarm. He dropped a hint which may interest outsiders, to the effect that propositions covering matters of great importance have been made to the National Executive Committee whereby the expense of litigation shall be saved to the members of the National Association and a release given them from liability, and that these propositions can be carried out better with a limited membership than if the membership were larger, which is an entirely superfluous statement on the part of Secretary Seamans. We can say in fewer words than that that millers in or out of the National Association will not be put to any expense, or be liable to litigation, if Congress passes the Harrison patent law, which it doubtless will do, and provided millers themselves purchase patented machinery in good faith for personal use. That law passed and the Millers' National Association's occupation as a defender of the guilty and innocent alike, is gone.

THE clearing-house scheme as an adjustment for freight troubles is all right as to theory, and will eventually work out as to practice. But the fast freight lines in all their paraphernalia is too old a growth to be wiped out in a hasty manner. There are too many heavy railroad stockholders interested in fast freight lines and at the same time there are a good many strong men employed by these lines who will do all in their power to prevent a change. To describe what is meant by this clearing-house scheme, or plan, it may be said that through business will be done directly with the railroad offices, that the shipper would get his through bills from the same source that he would a local bill and without the intervention of line agents, this part of the expense being wiped out. Several plans for apportionment and records for pool business are proposed, but the principle will have to be worked out before the details are fully considered. There is in England a railway clearing-house system for maintaining rates and settling balances, which has been in successful operation for more than twenty-five years.



The *American Miller* is a magnificent specimen of a successful and deserving trade journal. THE MILLSTONE accords it a position at the head of the milling press of America as the well-earned reward of solid enterprise and decent self-respect.

Palliser, Palliser & Co., of Bridgeport, Conn., send their latest architectural publication "Specifications for Frame and Brick Buildings," with which is incorporated two copies of a blank form of building contract with bond. Anybody going to build and don't know exactly how to build will find this book just the thing to direct them in making their contract. The book and bonds can be had for 50 cents, postpaid, by addressing the publishers.

We want to say for the *Miller and Manufacturer*, of Cincinnati, that it is a decent, interesting and well-edited journal, but when it refers in a certain way to THE MILLSTONE as "our sprightly Indianapolis cotemporary" it is crediting us with what we are not. There's nothing "sprightly" about us, as the term has come to be misused among milling journals. The "Indianapolis cotemporary," part of the quotation is all right, but the distinction belongs to the "other fellow."

LOOKS DANGEROUS.

IN the accompanying drawings and specifications THE MILLSTONE presents for the first time to the milling world a complete description of a patent which has features likely to cause trouble in the near future to millers who have machines in use infringing them. This patent is the property of the Wheat Meal and Break Purifier Co., of Washington, D. C. It is the invention of Charles M. Roberts, several years ago a well-known millwright in Indiana and the West, and whose sudden death in January, 1881, was at the time duly chronicled in these pages. The owners have issued a circular to millers and mill builders in which they state their claims in the invention and their purpose to demand from parties using their property "just, reasonable and liberal terms of settlement." A synopsis of the claim is: In 1858 Roberts constructed and operated in his mill at Brucetown, Va., a middlings purifier, in all its general features like the purifier of to-day. About the same time he filed application for a patent, depositing a model of his machine, but his solicitor dying in the meantime no patent was obtained. The model is said to be at the present time in possession of a scientific school at Philadelphia.

With the advent of new process milling Roberts' mind became active in mastering the problem of purification of flour by means of the air current. His efforts and experiments resulted in his obtaining a patent, on the 10th day of July, 1877, as herewith illustrated and described.

The broad claim upon which rests the hopes of the owners of this patent in getting redress from infringers, is that "the device covers any method of manufacturing flour which subjects, at any stage, or steps, of the comminution of the berries, the entire mass of meal, chop or groats, before bolting, to the action of air currents for the purpose of purification." Soon after Roberts got his patent it was put into practical operation in his father's mill at Greenfield, Md., in the Columbia Mills, at Georgetown, D. C., operated by the Welch Bros., and at Maysville, Ky., and other places. When roller milling was in its incipient stage Roberts took service with Nordyke & Marmon Co., of this city, and it was while thus engaged that he was taken suddenly ill and died Jan. 25, 1881. After his death Rosia W. Welch filed an application for a patent for an "improved process of purifying chop or meal of ground wheat, which consists in subjecting the chop or meal to a current of air in a mechanism placed between the buhrs and bolts, substantially as set forth," which was rejected on the ground of Roberts' prior invention. The Welches then became possessed of the Roberts patent and took it to Minneapolis to introduce it in mills there, and it was so introduced into the Crown Roller Mill in the presence of Christian Bros. and others, with indifferent results. E. P. Allis & Co. had placed the improvement in Herr & Cissel's mill at Georgetown, D. C., whereat Welch instituted suit in equity, which suit was compromised, and the mills of Allis & Co. duly licensed. Such in brief is a synopsis of the circular issued by the company owning this patent. The company is not anxious to go to law to maintain their rights, but prefer "to deal with business men upon business principles, and in a business manner," which means they are hard-up and prefer to settle without a contest in the courts, which might involve all the damages likely to be awarded. Sensible determination! THE MILLSTONE sees in this patent some things that may possibly

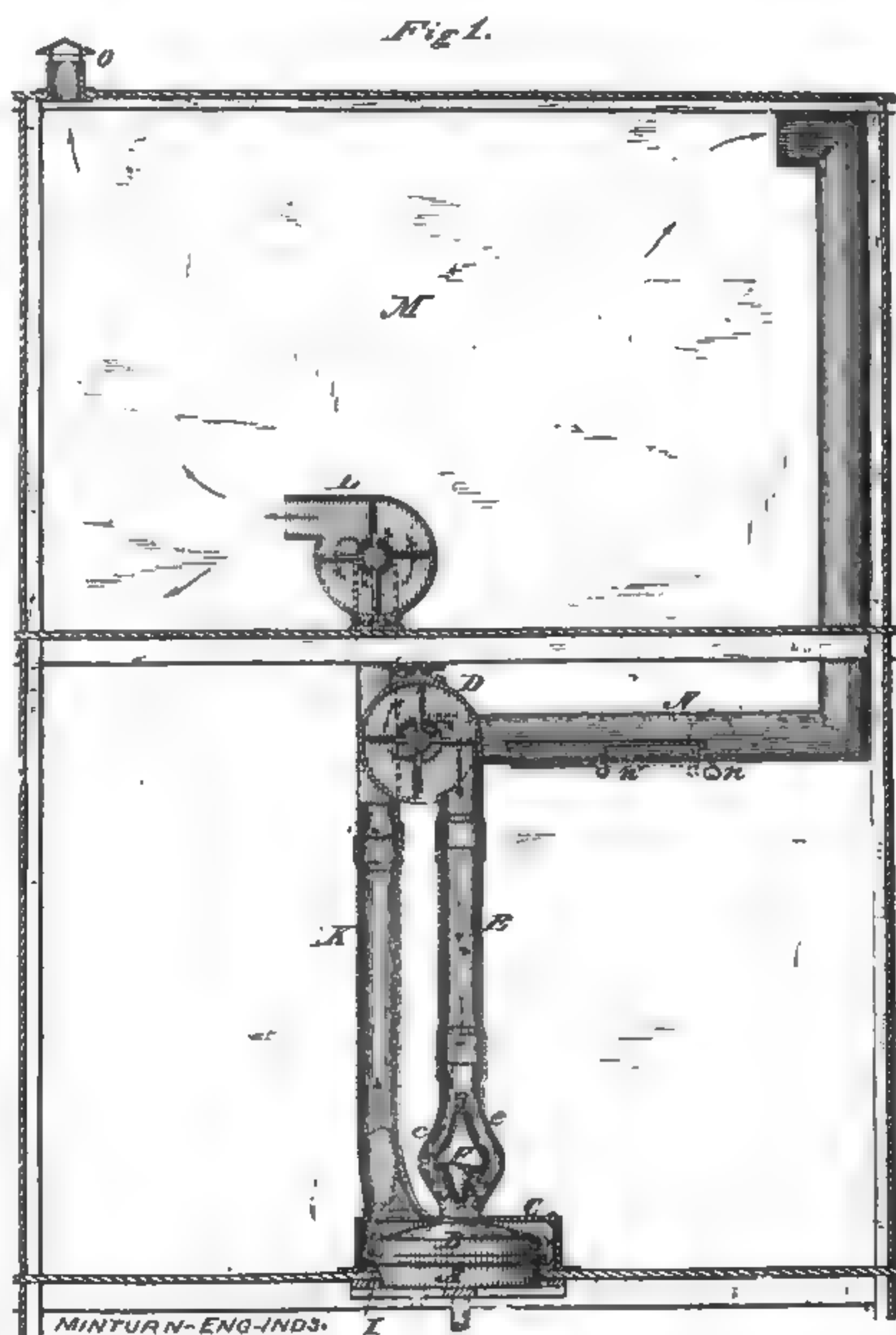
make a "heap of trouble" if they are not nipped in the bud. The fact that a large mill furnishing concern has purchased immunity for its customers is not proof of danger, by any means, but the fear lies in the stronger fact that, as our drawings show, there are features in the Roberts patent that have a broader application to modern milling methods than the casual reader might suppose. The Millers' National Association have the matter in consideration upon which report will doubtless be made at the forthcoming convention in Chicago, in June next. Following is the full text and description of the patent:

Improvement in Processes and Machinery for Manufacture of Flour.

[Specifications forming part of Letters Patent No. 193,039, dated July 10, 1877; application filed June 28, 1877.]

To all whom it may concern:

Be it known that I, Charles M. Roberts, of Washington, in the District of Columbia, have invented a new and Improved Process and Machinery for the Manufacture of Flour; and I do hereby declare the following to be a full, clear and exact description of the same, reference being



had to the accompanying drawings, forming part of this specification, in which

Figure 1 is a vertical section of the mill and of the blast and suction apparatus. Fig. 2 is a vertical section of the millstones, with their inclosing-case, feeding apparatus, and other connected mechanism. Fig. 3 is a horizontal section of the blast-pipes, showing a plan view of the hopper and the device for adjusting the feed-valve. Fig. 4 is a top plan view of the hoop or case inclosing the millstones, showing, in horizontal section, one of the suction openings therein, and the blast-pipe and feed-valve. Fig. 5 is a plan of the upper stone, showing one mode of applying the lateral rakes or sweeps thereto. Fig. 6 is a vertical section of the millstones, showing the supplementary blast-tube, the rakes, and the discharge-valve for the flour, middlings, and bran. Fig. 7 is a top plan view of the bed-stone, showing the surrounding air-pipe, the arrows indicating the currents moving upward and outward therefrom. Fig. 8 is a vertical section, showing one mode of producing the air-blast in the supplemental blast-pipe surrounding the bed-stone; and Fig. 9 is a bottom plan view of the bed-stone and supplemental blast-pipe, showing the tubes which convey the air from the fan to such pipe.

Similar letters of reference in the accompanying drawings denote the same parts.

In the manufacture of wheat flour by the processes heretofore in use, two difficulties have been encountered, which, from their peculiar relation to each other, have been regarded as practically insurmountable, for the reason that any attempt to overcome either caused a proportionate aggravation of the other. These difficulties have arisen at the outset of the work, to-wit, the grinding of the wheat, and have resulted from the operation of the grinding-surface upon the berries. On the one hand, where the system of

high milling has been adopted it has been found impossible to obtain the entire yield of flour, because the stones, under that system, are set too far apart to detach all the flour from the hulls, and no subsequent process of bran-dusting has ever been able to compensate for the loss thus occasioned. On the other hand, where the system of low milling is used, as ordinarily practiced, a portion of the wheat is reduced to meal of the proper quality almost immediately upon its entrance between the buhrs, and then, instead of being instantly ejected while in proper condition, it is obliged to work its way slowly out to the edge of the stone, during which passage it is ground over and over until it is heated, its natural oils, moisture and gluten liberated, and its quality impaired. In such regrinding a part of the bran is so finely pulverized that it cannot be afterward sifted from the flour, while other portions, coming in contact with the liberated moisture and gluten, are pasted to the flour and middlings so tenaciously that no subsequent treatment can liberate them.

My present invention consists in the discovery of a process of grinding and purifying, and the invention of mechanism therefor, by which all these difficulties are obviated, and the greatest yield secured with the best quality of flour.

The principle of the invention consists, first in filling the eye of the stones with air under great pressure, by means of a fan, pump, or other equivalent means. The air, passing between the buhrs with the wheat, assists in feeding the wheat to the grinding-surfaces, and forces out the meal all around the buhrs as fast as it is ground. The force of the blast should be sufficient to eject the meal instantly from the grinding-surfaces, so that it will not be ground over and over, and so that the bran will not be ground too fine to be sifted from the flour. The stones should be adjusted just far enough apart to clean the bran without disintegrating it, and to this end I recommend that the actual thickness of the hull of the grain be taken as the proper minimum distance between the stones or other grinding-surfaces. One effect of the air-blast will be to cool the stones, but this is only an incidental result and is not the main object. A light current, produced either by blast or suction, will cool the stones, but will not fully accomplish my main object of forcing the feed of the wheat and instantly ejecting the meal as fast as it is produced, which is only to be accomplished by a powerful blast forced in with the wheat and not drawn in by suction.

One consequence of this blast is that it causes the meal to be projected from the edge of the stones in a wide, thin, horizontal sheet of uniform density and of a vertical thickness equal to about the distance between the grinding-surfaces. The meal thus spread out is in exactly the proper condition to be acted upon by a gentle current of air, for the purpose of separating and removing from it the light "specks" and "fuzz," which constitute the chief obstacle to the purification of flour and middlings.

I, therefore, as the second part of my invention, apply to the thin sheet of meal around the edge of the stones a light upward current of air, preferably in the form of thin jets or a continuous thin sheet, which, blowing up through the horizontal thin sheet of meal, lifts the light impurities therefrom, and carries them upward until they come within the influence of a gentle upward current of air induced in the upper part of the hoop or inclosing-case by means of a suction-fan. The heavy flour, middlings, and bran fall by the action of gravity, upon the floor of the hoop, and are thence delivered by suitable rakes or scrapers, through a normally-closed valve-spout, into a suitable receptacle below, or directly into a separating bolt or screen, which separates the flour, the bran, and the middlings. The middlings are afterward subjected to a similar operation between two other grinding-surfaces in connection with air blast and suction substantially as before, by which they are separately purified, and after being purified, are reground, rebolted, and mixed with the flour purified at the first operation. The entire combination of processes, therefore, includes the perfect grinding of the grain, so as not to impair its quality, the purification of the fine flour, the separation and grading of the materials, the complete purification of the middlings, and the rebolting and mixing of the purified middlings with the purified flour.

The mechanical means which I prefer for the accomplishment of these results are represented in the accompanying drawings, which I will now proceed to describe.

A B represent the first grinding-stones or buhrs. No particular mode of dressing these buhrs is necessary; but I prefer to dress them with broad smooth furrows and narrow lands.

The ordinary hoop C may be used; but I prefer to substitute therefor a larger inclosing-case, so as to give more space for the thin horizontal sheet of meal around the buhrs, and to make this casing high enough to provide abundant space for the gentle upward air-current induced by the suction-fan.

If the casing is two or three feet higher than the buhrs, or more than that, it will be of advantage.

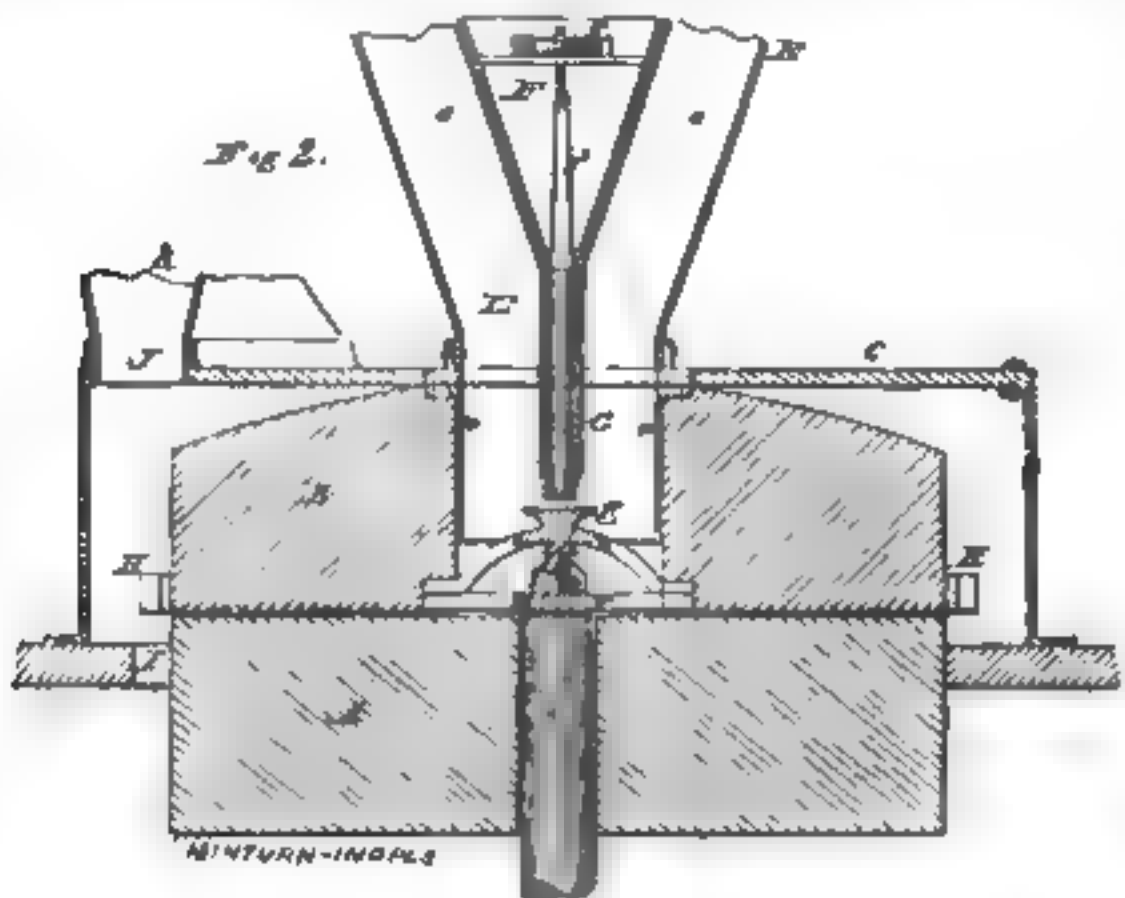
Into the eye of the runner B I fit the lower end of a large air-pipe, E, by any suitable means which will make a tight joint without interfering with the action of the stone, the pipe being supported by securing it, in any proper manner, to the top of the air-chamber C. Through the pipe E a powerful blast of air is continuously forced into the eye by means of a fan, D, or its equivalent, driven at a high speed by any suitable mechanism.

The air may be supplied to the fan by a pipe, N, leading from the dust-room M, or the passage from the dust-room may be closed by a damper, n, and the air taken from the lower chamber through a valve, n'; or, if preferred, the air may be taken from outside of the mill by a suitable pipe.

The grain is fed into the eye with the air-blast, the means employed for that purpose, being, preferably, a hopper, F, communicating with the eye through an adjustable tubular valve, G, connected by arms G', to an adjusting-screw, G'', above the grain in the hopper. The weight of the grain in the hopper and feed-tube will be sufficient to resist the force of the air-blast, and the raising and lowering of the feed-tube will, in connection with the saucer g, control the feed. The eye should be lined with some suitable material, as

shown at *a*, in order to effect an air-tight joint with the casing, the lining being extended up, or a tube for the casing down sufficiently far for that purpose.

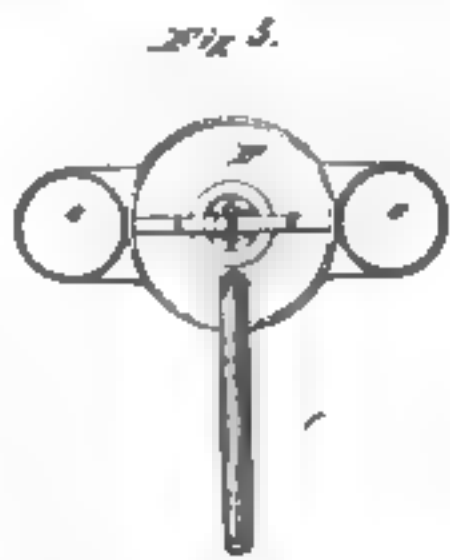
Around immediately beneath the edge of the bed-stone I apply a horizontal air-tube, *P*, having a thin slot or line of perforations along its upper edge, and connected by a series of pipes, *p*, with a compressed air-reservoir, *Q*, or a blast-fan, *Q*. As the meal is projected outward from the stones by centrifugal action, combined with the force of the blast from the eye, it is acted upon by the thin upward



current from the pipe *P* in such a manner that the light impurities are carried upward, while the flour, middlings and bran fall, and are, by means of scrapers *H*, forced into the meal-discharge pipe *L*. When the accumulated meal in the discharge-chute overcomes the resistance of the counter-balance valve *i*, the latter opens, discharges its load, and automatically closes to receive a new charge.

The rakes *H* may be of any suitable form, and may, if preferred, be inclined so as to scoop under the meal and lighten it up, in order to increase the action of the blast upon it.

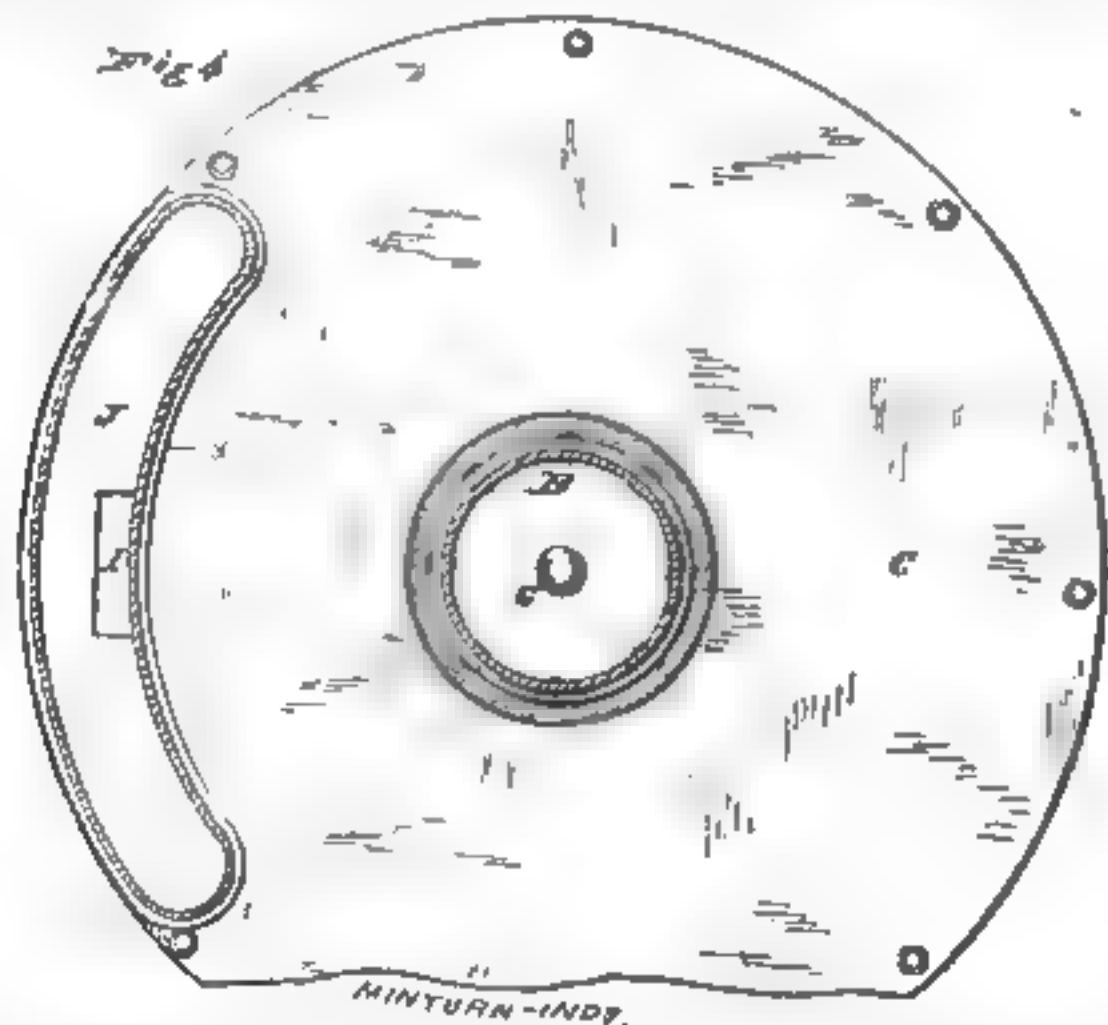
Having thus provided for the action of an upward current of air upon and through the horizontal sheet of meal around the edges of the stones, I connect the upper end of the casing or air-chamber *C* with a slow suction-fan, *L*, by means of an air-pipe, *K*, extending from the suction side of the fan to a series of openings, *J J J*, in said casing or air-chamber. The force of the suction-fan is nicely adjusted, so that it will induce a light uniform upward current in the top of the air-chamber *C* sufficiently strong to carry up the light impurities, but not the fine flour. The light impurities are discharged into the dust-room, which is provided with a ventilator, *O*. The force of all the air-currents is under the control of the attendant by means of suitable valves in the



pipes or elsewhere, or by controlling the speed of the fans or other blowers.

The blast-fan *Q* may be omitted, if preferred, and the pipe *P* filled by a tubular connection with the pipe *E*, provided with a suitable adjusting cock or damper.

The flour, middlings and bran having thus been purified of the light pulverulent matter which they contained when discharged from the stones, are then bolted so as to separate the flour and coarse bran from each other and from the middlings. The middlings will then be found comparatively pure, and may be reground, rebolted, and mixed with the flour, if desired; but as the suction at the flour-buhrs is made very light, in order not to waste the flour, it will be found advantageous to put the middlings through another similar process of spreading and purifying by means of middlings-buhrs combined with air-blasts and suction similar to those already described. The middlings-buhrs may be made of disks of iron, wood, or other suitable material, their office being to reduce the middlings to, and discharge them in, a thin sheet, so that the purifying currents can properly act upon them. The suction current at the middlings-buhrs should be somewhat stronger than at



the flour-buhrs, as the greater weight of the middlings will prevent loss therefrom, and the purification will be more effectual. The middlings resulting from this process will be of the best and purest quality, and may be reground, rebolted, and mixed with the flour in the usual manner; but in regrounding I recommend the employment of the air-blast in the eye of the stone in order to prevent injury to the quality of the flour.

In describing the auxiliary upward current of air introduced by means of the pipe *P*, I have intended to describe the best means for accomplishing the purpose; but I do not

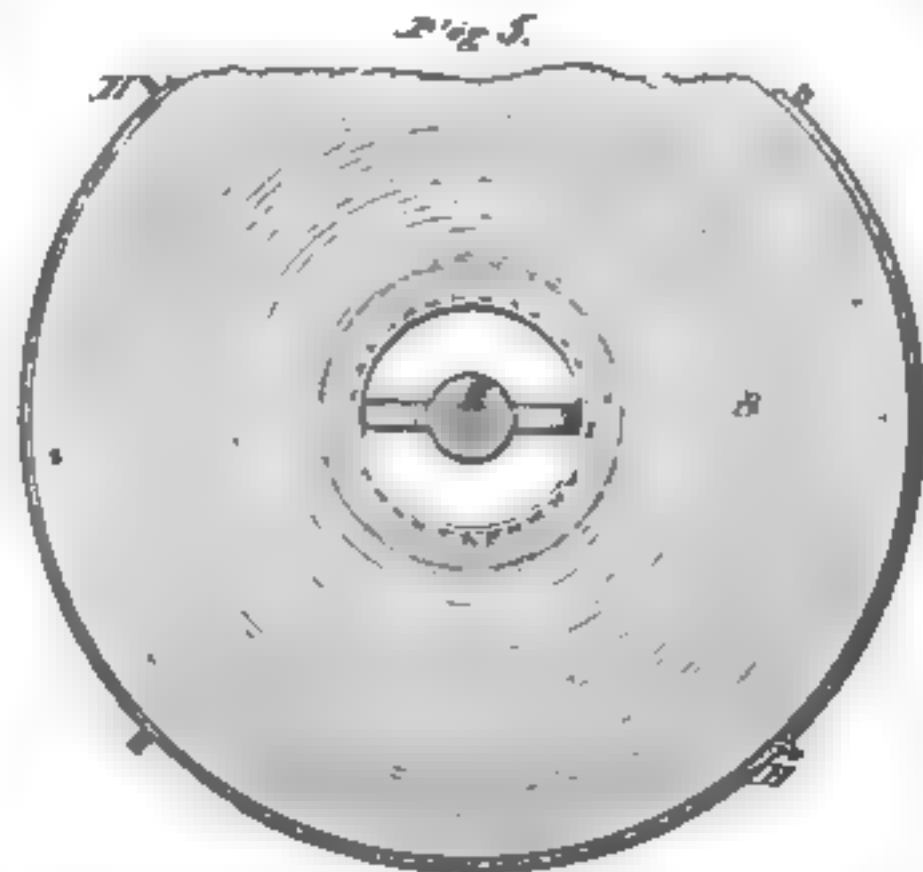
mean to be understood that said pipe or its equivalent is absolutely essential, inasmuch as the air-suction from fan *L* will accomplish the result measurably without the assistance of the blast from pipe *P*. Again, when pipe *P* is used, even the suction-fan *L* may be omitted without destroying the useful character of the machine, for the upward currents from pipe *P* will, if outlets in the top of the casing be provided, carry off a large proportion of the light impurities; and even without the suction-fan *L* or the blast pipe *P* the force of the blast coming out from between the stones will operate to take up through the top of the casing large quantities of said impurities.

The use of the apparatus in any of these modes I consider as merely the inferior equivalent of the combined operation of the main air-blast, supplementary air-blast, and suction-fan, which, working together, accomplish the result much more fully and perfectly; and I regard the use of the powerful forcing-blast in grinding, in connection with the subsequent purification of the meal or middlings by air-currents, as involving the general principle of my invention.

The arrangement of the grain-hopper between the branches *e e* of the blast-pipe is not essential. Any other arrangement that will answer the purpose may be employed.

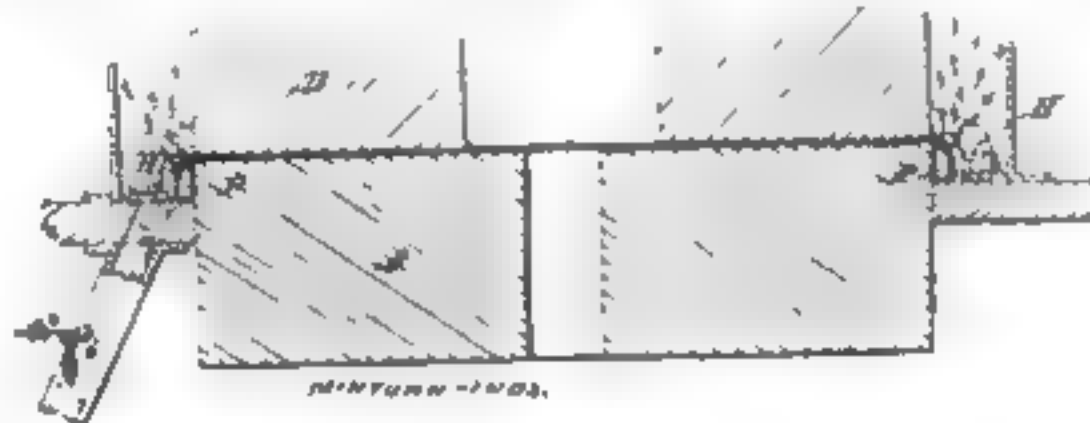
In the winter season it will be desirable to take the blast-air from the dust-room, (which should be a large room) in order to get the benefit of the higher temperature caused by the suction from the air-chamber *C*.

It will be observed that one part of my invention is the



process of first purifying the entire mass of meal, then separating the flour and middlings therefrom, and then repurifying the middlings, and regrounding and rebolting them. This process will be of advantage whatever system of grinding may be employed, and, although I regard my system as incomparably the best, I do not limit this part of the invention to any mode of grinding.

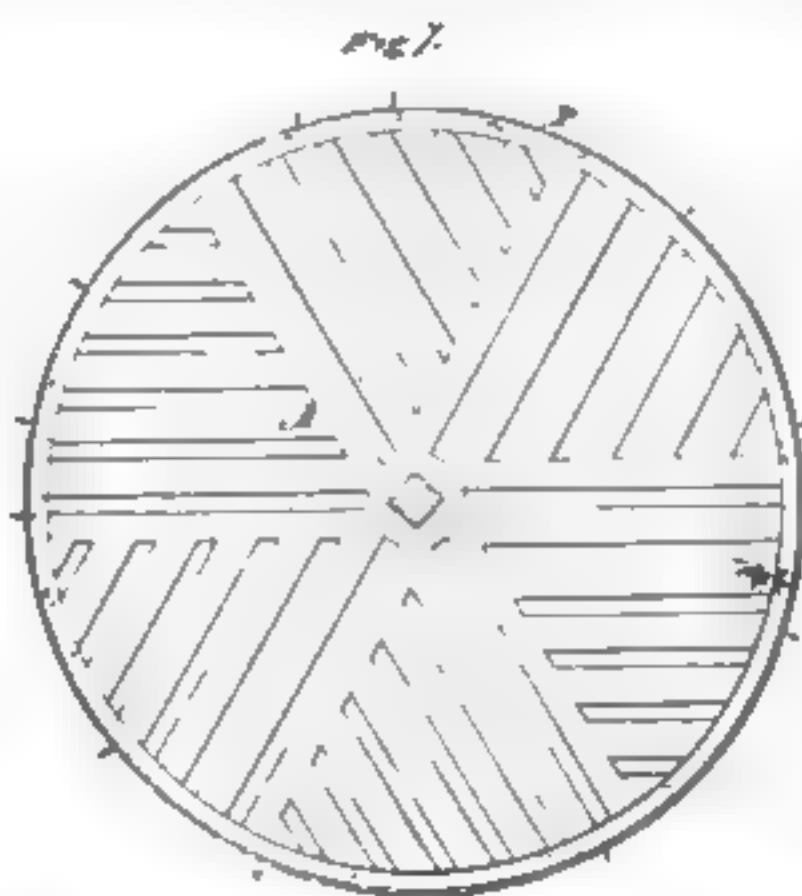
The invention comprises an entire system of milling, beginning at the grinding of the wheat, and ending at the complete purification of the flour and its separation and grading for the market. The system, as a whole, avoids the



disadvantages of the old systems of grinding, giving the best yield with the best qualities, obviates the necessity for employing costly machines for purifying the middlings, and saves the time, labor and power necessary for such operations. If, for any purpose, it is not desirable to use it at any time, the operator has only to ungear the fans, and the mill will then operate on the old principle.

I claim as my invention:

1. The process of manufacturing flour by first grinding the wheat in connection with a strong air-blast introduced at the eye of the stones to expel the meal, and afterward



purifying the ground meal or middlings by means of air-currents, in whole or in part, substantially as described.

2. The process of manufacturing flour by first grinding the grain, then purifying the meal by air-currents, then separating the flour, middlings and bran, and then purifying the middlings by air-currents, and regrounding and rebolting them, substantially as described.

3. The process of purifying meal or middlings by first forcing them by a blast of air between two disks, one or both of which revolve, in order to spread them out in a thin sheet, and then subjecting them to the operation of air-currents to remove the light impurities, substantially as described.

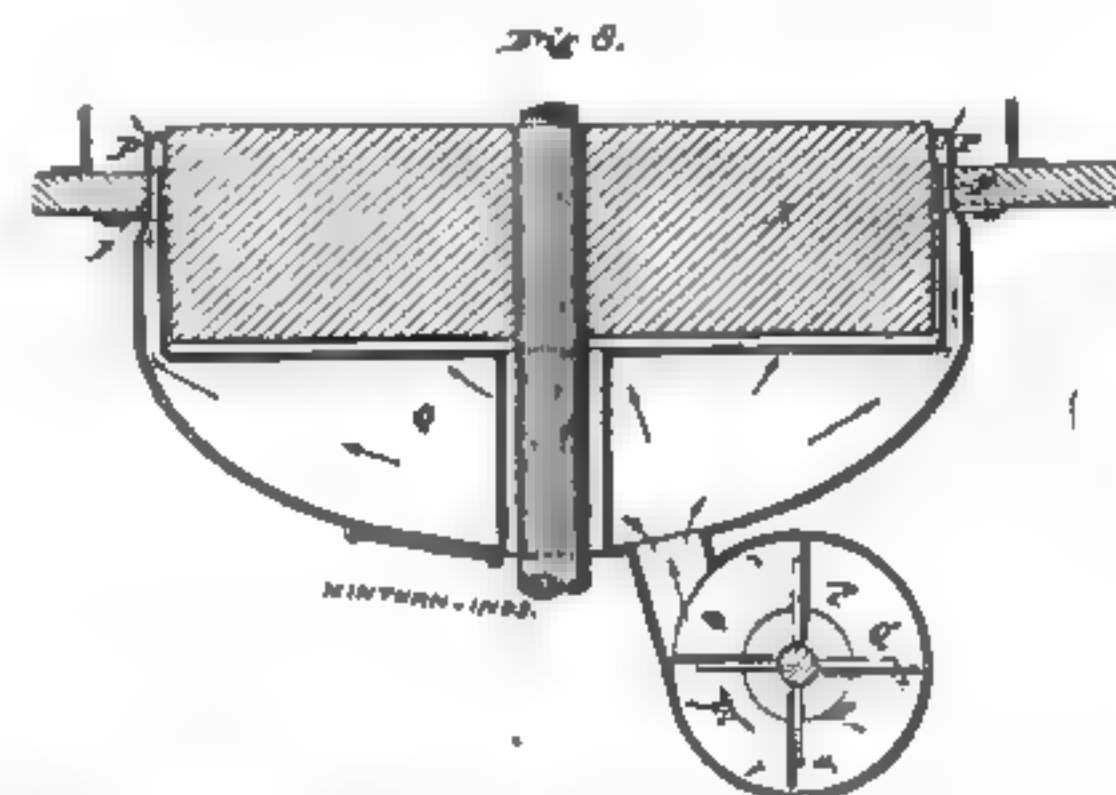
4. The combination of a bed-buhr, a runner, a blast apparatus to blow air into the eye of the buhrs, and a blast or suction apparatus to create a purifying air-current up through the meal ejected from the edge of the buhrs, substantially as described.

5. The combination of the buhrs *A B*, casing *C*, and blast-pipe *E*, with the normally closed discharge *I*, and the air-openings *J* in the top of the casing, to accommodate the discharge of the air currents with the light impurities, substantially as described.

6. The combination of the buhrs *A B*, casing *C*, blast-

pipe *E*, suction-pipe *K*, and the dust-room *M*, substantially as described.

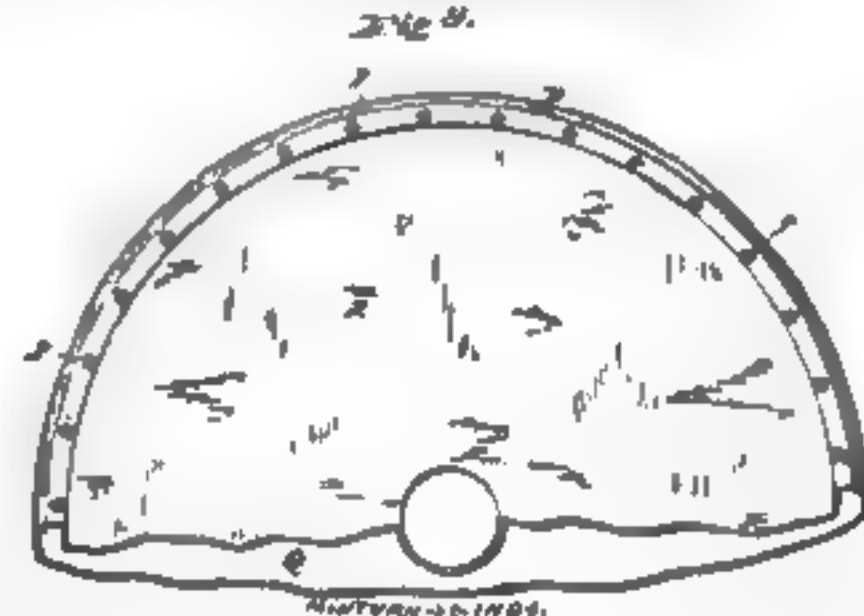
7. The combination of the blast arrangement *D E N*,



with the dust-room *M*, suction fan and pipe, and buhrs and casing, substantially as described.

8. The combination of the blast-pipe *P* with the buhrs, substantially as described.

9. The combination of the blast-pipe *P* with the buhrs,



the casing, and the suction pipe or pipes, substantially as described.

10. The combination of the blast-pipe *P* with the buhrs, the casing, the suction pipe or pipes, and the blast in the eye of the buhrs, substantially as described.

Witnesses:

A. D. V. BURR,
SAML. C. MILLS.

CHARLES M. ROBERTS.

About Wagon Wheels.

We copy the following from the *Farmers' Review*: I have a wagon on which, six years ago, the fellows shrunk so that the tires became loose. I gave it a good coat of hot oil, and every year since it has had a coat of oil or paint, sometimes both. The tires are tight yet, and they have not been set for eight or nine years. Many farmers think that as soon as wagon fellows begin to shrink they must go at once to a blacksmith shop and get the tire set. Instead of doing that, which is often damage to the wheels, causing them to dish, if they will get some linseed oil and heat it to boiling hot, and give the fellows all the oil they can take, it will fill them up to their usual size and tightness, keep them from shrinking and also keep out the water. If you do not wish to go to the trouble of mixing paint, you can heat the oil and tie a rag to a stick and swab them over as long as they will take oil. A brush is more convenient to use, but a swab will answer if you do not wish to buy a brush. It is quite a saving of time and money to look after the wood work of farm machinery. Alternate wetting and drying injures and causes the best wood soon to decay and lose its strength unless kept well painted. It pays to keep a little oil on hand to oil fork handles, rakes, neck yokes, whiffletrees and any of the small tools on a farm that are more or less exposed.

Flour Milling in India.

The export of flour from Bombay, chiefly to Aden and Ceylon and the East African coast, Mauritius and Natal, is apparently a thriving though not as yet a considerable trade; in five years the quantity exported has increased from 2,701,319 pounds to 6,816,048 pounds. This is very satisfactory in its way, though India imports flour herself quite unnecessarily. Except in Bombay, and in Calcutta to a small extent, the flour-making industry is in native hands, and is carried on in a petty and unclean manner. There should be ample opening for a large and profitable business in milling by concentrating it in capable hands in large and convenient centers. It is probable that native religious feeling would confine the flour made in European mills to European consumption, but the industry is eminently one that could be undertaken on a large scale by native capitalists.—*Dornbusch's List*.



Why We Cannot Answer.

To the Editor of The Millstone.

SIR: In your March issue you say: "We have formulated in our office the exact amount of grinding and bolting surface required for all sized mills, compiled from the best practice in a large number of first-class mills, etc." Now this formula to be of advantage to millers ought to give the proper amount of purifying cloth, as well as the grinding and bolting surface. Can you inform me what amount of properly ground chop will pass through the grades of Dufour's cloth 18 to 000, at one-fourth an inch to one foot pitch, also proper proportions of grinding and bolting surface required to handle a given quantity of material? M. GALVIN.

INDIANAPOLIS, Ind., April 5, 1884.

ANSWER: This is a question which we are very glad to answer. We can place ourselves in an incontrovertible position. We can give a diagram of a mill with a sufficiency, or rather the proper amount of bolting surface, but as to stating just how much stock will pass through cloth of any number we simply say that it is a question that no man can formulate. It would mean a consideration of a mass of conditions which cannot be numbered. For example: How much flour would pass through a No. 12 cloth? We don't know; and why? Because the stock which goes into that reel may be so soft that it will not bolt at all, so soft the reel will paste. An element of sharpness may be added, and as this proportion is increased the bolting capacity of that reel is increased, and in the meanwhile such capacity is affected by the state of the atmosphere as to its moisture, the temperature, and again by the dryness and the hardness of the wheat, the quality of the grinding, the kind of reduction machinery used, and so on into a class of conditions whose number cannot be given or qualities estimated, which would be necessary as a basis for a formula. This is altogether the most satisfactory answer to a technical inquiry we have ever been able to make. As we said before we can arrange the programme of a mill and state the amount of cloth necessary to do a given amount of work. In doing so we in a measure fix the sharpness of the material going into the reels by the numbers on the scalpers. Enough leeway is allowed in all such cases to make up for other variable conditions.

From Chili.

To the Editor of The Millstone.

SIR: I am in receipt of your circular dated Nov. 5, 1883. In reply to the same I would state that Chili is a wheat-growing country and consequently would afford a poor market for wheat and flour from the States. The climate and soil are very much like California, and produce a fine quality of wheat, and wheat and flour are articles of export from this country instead of importation into the country. Water power is used exclusively in this country in the manufacture of flour.

THE MILLSTONE contains notices of all the latest improvements in milling, and is a valuable paper to persons engaged in that business. I shall take pains to place it in such hands as may lead to the purchase of milling machinery in the United States.

Your obedient servant,

D. M. DUNN, U. S. Consul.

VALPARAISO, March 14, 1884.

From Venezuela.

To the Editor of The Millstone.

SIR: Your circular of Nov. 5, 1883, received. As regards the amount of trade in American flour and grain would say in reply that the importation of flour amounts to about 12,000 barrels per year, of which 10,000 are exported from New York and 2,000 from Trinidad. Of this amount 8,000 barrels are Haxall, 2,000 Tropical and the balance of differ-

ent brands. The duty on flour is equal to the first cost, or about \$5.60 per barrel.

Corn is prohibited from being imported, as it is raised here. Importation of bran and oats only amounts to 50 barrels per year, owing to the exorbitant duty, which amounts to more than the first cost. Yours respectfully.

JOHN DALTON, U. S. Consul.

CUIDAD-BOLIVAR, Feb. 13, 1884.

From Honduras.

To the Editor of The Millstone.

SIR: I am in receipt of your favor of the 5th of November last, and in answer of it I say: The importation to Amapala, the only port of the Pacific coast of this Republic and of this Consular District is about 25 tons of flour monthly, which comes mostly from San Francisco, Cal. Some small lots have come from New York, but by this way the introduction is a great deal more expensive. There is a little wheat grown in this country, but then there has to pass many years before they will grow enough for home consumption. The mills are entirely worthless. I am, sir, your obedient servant,

CARLOS ROLFF, U. S. Consul.

AMAPALA, March 6, 1884.

Missouri Millers' State Association.

To the Editor of The Millstone.

SIR: For various reasons it has been deemed best to hold the regular annual meeting of the Missouri Millers' Association this year at Chicago in connection with the meeting of the National Association, which is set for June, exact date to be fixed later, and the chairman of the executive committee instructs me to make this announcement to the members.

DAVID B. KIRK, Sec'y.

ST. LOUIS, March 21, 1884.

An Enlargement.

To the Editor of The Millstone.

SIR: On account of the increasing demand for our specialties we have been obliged to enlarge our capacity for turning out our goods. We are now building a nice factory at Humboldt, Ill., and by the time the April number of THE MILLSTONE is issued we expect to be nicely located in our new quarters. Our office and salesrooms will continue to be at 48 S. Canal-st., Chicago. Yours truly,

WM. E. CATLIN & Co.

CHICAGO, ILL., April 10, 1884.

Smokeless Locomotive.

After experimenting for many years, Dr. C. Holland has produced a locomotive engine that emits no smoke. It has been successfully running on the Eastern railroad, between Boston and Portland, Me., for three or four weeks. Its tender has a water tank somewhat larger than the usual size, and within this a tank holding 900 gallons of crude naphtha. This and the water from the outer tank are forced by a donkey pump through small valves into four retorts under the boiler, and are there decomposed, the oxygen of the steam uniting with the carbon of the oil at a great heat and leaving the hydrogen free. The fire can attain its highest degree of heat in ten minutes from the time it is lighted. The estimated cost of running the engine is six cents a mile—a saving of about 45 per cent. on the cost of coal. The oil is entirely consumed, and there is no escape of smoke and cinders.—*Western Manufacturer.*

Charcoal.

It is said that the best quality of charcoal is made from oak, maple, beech and chestnut. Wood will furnish, when properly charred, about 20 per cent. of coal. A bushel of coal from pine weighs about 29 pounds. A bushel of coal from hard wood weighs 30 pounds. About 100 parts of oak make 23 of charcoal; the same quantity of red pine 22.1, and of white pine 23.—*Exchange.*

MILLING PATENTS

[The following list of patents relating to the milling interests is specially reported to THE MILLSTONE by Franklin I. Hough, Solicitor of American and Foreign Patents, 6 Seventh street N. W., Washington, D. C.]

ISSUE OF MARCH 25, 1884.

Ny. 295,863—Bran and Feed Packer. S. B. Ellthrop, Rochester, N. Y.

No. 295,643—Grain Drier. R. S. Jennings, Boston, Mass.

No. 295,764—Grinding Mill. H. Hungerford, No walk, Ct., assignor by mesne assignments to U. Cotton Seed Cleaning Co, New York, N. Y.

No. 295,555—Middlings, etc. Bolt for Purifying O. P. Hurford, Oakdale, Neb.

No. 295,852—Mill-feeding Device. J. B. Alfred, Cumberland, Md.

ISSUE OF APRIL 1, 1884.

No. 296,135—Bag Holder. P. Cole, Pipeston Minn.

ISSUE OF APRIL 8, 1884.

No. 296,309—Fanning Mill and Seed Cleaner combined. N. M. Bowen, Knightstown, Ind.

No. 296,553—Feed Bag. J. W. Gedney, New York, N. Y.

Manure as Fuel.

It may not be generally known that manure can be profitably used under boilers as a fuel, and such appears to be the fact. For a year past John O'Brien, a boiler maker of this city has been using the manure of his boiler yard stables, mixed with coal; and more than six years ago the St. Louis Lead and Oil Company used large quantities of worn-out manure under their boilers, they having previously been put to other uses in their works. At Mr. O'Brien's works the manure is used immediately after it is taken from the stable, though it is not thrown upon the fire except when steaming up and the fireman thinks he has "a good live fire." Two or three scoopfuls are thrown in, followed as many more of coal. At the Lead Works, understand, the manure was introduced into the furnace through a kind of specially constructed funnel. We do not suppose that manure is specially valuable as a fuel, but the burning of it under boilers affords an easy and profitable way of getting rid of it, when special circumstances are against its use as a fertilizer.—*St. Louis Age of Steel.*

A New Metal.

A New York scientist claims to have discovered along the Lehigh valley a hitherto unknown metal which will some day supplant nickel in general. He was making an experiment with an explosive substance mixed with pulverized furnace slag which, on being heated, caused an explosion to take place. Upon examining the crucible in which the mixture had been, he found that a chemical process had taken place by which an apparently valuable, but hitherto unknown, metal had been eliminated from the slag. It was silvery white in color of fine, smooth texture and susceptible of a brilliant polish that no exposure will tarnish. It was found to be malleable, ductile and of great tenacity, showing a tensile resistance of 140,000 pounds to square inch. Further experiments only confirm the results of the first trial, and a company has been organized for the purpose of "working" the large slag banks along the Lehigh valley for new metal.

Tailings.

Mr. J. T. Walker came to his office this morning with a countenance as bright as a June day, a brief inquiry elicited the fact that it was a boy. Friends think that if this new boy makes as good a name as the double current middlings purifier future historians will bless the day of his birth. *Easton (Pa.) Free Press.*

A NEW CENTRIFUGAL.

MANY persons have thought that the era of invention in milling machinery had about run its course, and that a demand no longer existed for different appliances for the manufacture of flour than what has already been brought forth. It is false reasoning to declare that nothing can be added to what already exists in the line of manufacturing machinery of any description. While the world's population continues to grow, and man's mind remains active, just so long will inventive genius devise improvements on processes and machinery however perfect they may seem to be.

Since the introduction of the centrifugal flour dressing reel into this country, less than four years ago, the improvements in that machine have been as numerous and remarkable as in any machine that is become a part of modern flouring mill methods. The Geo. T. Smith Middlings Purifier Co. were the first concern to make a specialty of the sale of these machines, and have perhaps disposed of as many as all other manufacturers put together. In November last this company placed upon the market a new and improved centrifugal reel, for which there has since been a large demand. This reel is the result of nearly a year's constant and careful experiments, conducted in the experimental shop of the Smith Company, and in its conception and development some of the best inventive talent and the most skillful and accomplished masters of mechanics the country affords, have been employed. In this machine the feed and discharge devices, which are important points in a centrifugal, are made as nearly air-tight as it is practically possible; and to still further place under control the regulation of the air currents which are unavoidably drawn into this class of reels to a greater or less extent, the reel is made to tail over into a dead air chamber, and means are provided for admitting air at both ends, and preventing or causing the flow of a current through the reel in either direction. This controllability of the air currents widens the range of usefulness for centrifugals, adapts this reel for either a scalper or dusting reel, and adds greatly to its capacity and efficiency. In the construction of the reel cylinder the stay rods which connect the heads are set in some distance from the circumference of these disks, and the hoops which support the cloth are carried on studs about one inch in length, secured to the stay rods. The effect of this arrangement is to set the silk $1\frac{1}{4}$ inches away from these rods, whereas in all, or nearly all, other centrifugals the cloth rests directly on or merely clears them by the thickness of the hoop. When it is stated that all classes of material accumulate and remain in the angle formed by the cloth and stay rods when they are in close proximity to each other, and that in the case of heavy and soft stock, such as

run to centrifugals in most instances, this accu-

mulation is sufficient to cover 20 per cent. of the silk surface, decreasing the bolting capacity of the reel to that extent, the value of a construction that entirely obviates the banking up and carrying over in even the smallest degree will be appreciated.

An entirely unique feature in this reel is the introduction of an internal device for lifting and discharging onto the beaters the stock which is being bolted. There are six of these devices, which are hinged loosely to the stay rods of the reel, and are so balanced as to discharge their load at the point where the action of the beaters upon it will be most effective. It has been found by actual tests that the addition of this device and the setting away of the silk from the stay rods, more than double the capacity of the centrifugal.

Another entirely new feature of this reel, relating to its mechanical construction, is the manner of supporting the beater shaft. Instead of using independent bearings for this shaft, a box is introduced into the trunions, which form journals for carrying the bolting cylinder on each of the reel heads, and these boxes rest in a universal bearing, so that they are always in line with the shaft, thus avoiding undue wear or binding, and greatly de-



creasing the power consumed in driving the reel, besides being lighter, stronger and much more easily replaced when worn than the Babbitt lining of the ordinary bearing.

These improvements, with many more of scarcely less importance, are the invention of officers or employes of the Smith Company, and chiefly of Mr. Smith himself. As has already been mentioned, the demand for the reel is very large. Some idea of its extent may be formed from the fact that the capacity of the centrifugal department of the Smith Company's works, which turns out seven complete machines each day, is being enlarged to meet it. The machine is highly spoken of by all who have used it, and the manufacturers are selling it with a guarantee of its excellence.

High chimneys for factories have become unnecessary in England by the introduction of a new kind of oven. They enable any manufacturer to obtain of every ton of slack he uses, coke worth \$2, tar and ammonia worth \$1, and 14,000 feet of gas to generate steam. The coke, tar and ammonia will thus, it is claimed, considerably more than pay for slack, wear and tear, etc.



It ain't allus de silent man dat's de smartest. De sheep doan make ez much fuss ez de dog, but he ain't got nigh ez much sense.

Young woovers eating chicken pie should not forget to say to the fair ladies by their sides at dinner time, "May I lay my bones by yours?" Weddings are warranted to follow.

Startled Owner: "Hey, what are you doing there?" Colored thief, who has just fallen through sky-light, : Ise blown here, boss, by dat hah dreadful hurricane we had Souf."

"Mamma always gives you more than me." "Never mind; she's going to put mustard plasters on us when we go to bed to-night, and I'll ask her to let you have the biggest."

"What are you going to be when you are a man?"

asked a gentleman of a four-year-old toddler. After a moment of deep thought: "Well, I guess I'll be the father of some other little boy." □ □

"If you would freeze," said George, snuggling up a little closer, "you would make delicious ice cream." "If you were to freeze," responded Amelia with severity, after catching a whiff of his breath, "you would make a rum punch."

"Rebecca," said Mose Schaumburg to his wife,

"I wants you to gif me your photograph."

"Und vat in de world do you vant mit mine photograph?" inquired the wife.

"I wants to paste it on my pipe. Times vas so pad I wants to break mineself of shmcking," answered Mose.

"I hear you is bin mighty sick, Brother Borum. You is looking like you might a had a spell of malicious fever." "No, Sister Tempy, I neber had de fever, but wusser den dat; I'se been mighty nigh the kingdom of deff, wid de delicious tremenjous. I'se had one good tussel wid de debil, and he liked to got dis nigger."

Brother Gardner: Up to the beginnin' of de eighteenth century Truth was held in great esteem 'mong all nashuns, but fur de las' 200 y'ars de biggest liar has taken de cake. While de liar may git along tolerably well fur a few y'ars, an' even reach de pint of holding' an offis an' ridin' in the same street car wid de postmaster, de mills of de gods am slowly grindin' away, an' all of a sudden he gits a drap an' am swept off de checkerbo'd. When you can't believe what a man says you have no funder use fur him.

APRIL

Oh, April, thou art come again!
I love thy changeable moods;
Thy tender smiles, and pattering rain,
And the murmuring of the woods.

The sun returns to scatter wide
Fresh blessings o'er our ways;
The clouds drop down their benisons,
The fields send up their praise.

The seeds asleep through winter's chill
Wake from their long repose;
Comes the sweet music of the rills
Where soft the south wind blows.

The daffodils and crocus bloom,
Stately the tulips stand;
The arbutus trails its fragrant vine
And flowers on every hand.

The mountain streams, unbound and free,
Their devious pathways take;
The woods put on their mantles green,
While all the vales awake.

The birds are singing in the glades,
Where late the cold winds sighed;
Half hidden by a mossy stone
The modest violets hide.

As a young maiden, coy and fair,
Oft blushing through her tears,
So with the sisterhood of months
Glides April through the years.

Thoughts unexpressed are in her heart,
Soft love-light in her eye,
Her hands are full of precious seeds
For the harvest "by and by."

April! We welcome thee! Thy tears,
Through which the sunlight glows
So full and clear, are quick transfused
And bent in gracious bows.

And though the form of May be fair,
And breath of June be sweet,
We know no music half so rare
As the coming of thy feet.

—Edwin H. Bronson, in *Philadelphia Times*.

FLOUR EXPORT TO SOUTH AMERICA.

THERE being a prospect of a notable increase in our export of flour to some of the countries south of us, it may not be amiss to investigate how this trade developed during the four last fiscal years ending June 30. In order to do so thoroughly THE MILLSTONE has prepared a table showing the export to each of the countries during the period named, noting down at foot of the tabular statement the amount of flour shipped to all quarters:

Fiscal Year.	1883	1882	1881	1880	Total.
Mexico.....	21,513	11,928	11,657	2,486	47,584
Central America.....	94,537	84,316	96,532	102,791	378,226
British Honduras.....	19,742	13,743	14,723	13,084	61,272
Cuba.....	237,815	56,955	80,879	101,376	476,875
British West Indies.....	374,038	361,630	446,922	233,950	1,516,540
Porto Rico.....	75,327	40,038	46,261	56,520	218,146
Hayti.....	96,203	91,564	174,952	85,356	448,155
French West Indies.....	91,976	82,608	94,741	94,551	363,856
St. Domingo.....	25,020	13,432	20,793	21,364	85,609
Dutch West Indies.....	21,555	25,823	30,016	111,385	188,789
Danish West Indies.....	30,307	22,621	32,614	30,794	116,336
Brazil.....	739,441	618,908	677,702	537,914	2,573,965
Colombia.....	51,430	58,050	39,006	34,503	182,989
Argentine Republic.....	106,152	101,027	86,805	93,363	387,347
Venezuela.....	114,460	101,782	126,593	112,544	455,379
British Guiana.....	9,404	4,685	.....	918	14,707
Uruguay.....	.....	.....	.....	5,136	5,136
Peru.....	12,727	14,128	8,631	7,825	43,311
Dutch Guiana.....	2,085	2,203	2,275	2,092	8,655
French Guiana.....	.....	.....	.....	.....	.....
Totals.....	2,134,282	1,710,351	2,000,897	1,670,586	7,506,101
Totals to all quarters.....	9,205,664	5,916,886	7,945,786	6,011,419	29,078,555

By reference to this table it will be seen that one quarter of the aggregate of flour exported during the four years went to these twenty countries, Brazil taking the largest amount, next to it the British West Indies followed by Cuba, British Guiana,

Hayti, Venezuela, Central America, the French West Indies and the rest.

Mexico, it will be seen, has taken nine times the quantity taken in 1880, Cuba took over four times as much as it did in 1882, Porto Rico nearly doubled its takings the last year, while Brazil begins to take an amount unprecedentedly important.

Now that there is rail all the way between New York and the City of Mexico, it is safe to predict our sister republic will draw large amounts of flour from this country. Cuba and Porto Rico under the new regulations placing imports from here on a much more favorable footing than formerly, will increase their import of American flour materially, no doubt. Brazil, with higher coffee prices and a very large sugar crop, will not unlikely consume more flour than ever before; to a moderate extent the southern provinces of Brazil now begin to take Argentine flour, but on the other hand our flour has been gradually superseding Hungarian in northern Brazil.

There is at the present time not a single revolution or rebellion in any of the countries south of us, the war on the Pacific has come to a close, and crops, with the exception of a moderate deficit in the Brazilian coffee crop, are all very abundant, sugar notably, even cocoa, but at prices a great deal lower than last year; yet large crops, even at moderate prices, mean prosperity and lead to greater flour consumption, especially whenever the latter gets to be cheap as it is doing at present among us.

Should an abundant wheat crop be vouchsafed us this year, the chances are that with the surplus that will be left on our hands from 1883, we shall be able to furnish our tropical neighbors the staff of life on unusually favorable terms, so that they may easily take during the present fiscal year 2,500,000 barrels instead of 2,124,282.

About half of the countries of our list take more or less always the same amount of American flour even if the price exceeds the average by a dollar or two, whereas, in others where there is a large negro or Indian population, Indian corn in various shapes is consumed instead of wheaten bread from the moment the latter becomes dear.

In this manner, and besides to some extent influenced by the momentary freight rates, a variety of influences are at work to either exchange or moderate the takings of American flour down there, but taken as a whole our flour custom there is on the increase, since we produce now-a-days such a wide range of brands that will keep as well as the "Gallego" and "Haxall" of the old times.

Under a reciprocity treaty, Cuba alone would take four times as much of our flour as it does at present and so would Porto Rico; the French West Indies under the liberal colonial system now in force, our table shows, take 100,000 barrels annually; Jamaica and the other British West India islands, if flour be only cheap enough, may as well take 500,000 barrels.

An examination of our table will lead to the conclusion that in this flour export trade of ours to tropical countries, a very fair prospect is before us, judging from the four years of which we give the details.

Water in Wood.

Of green wood one-third to one-half or more of its weight is water, partly depending upon the time of cutting. All kinds of wood cut in January in the northern and western states, contain from 15 to 25 per cent. less water than they do in spring. Experiments have shown that 100 pounds of ash wood cut in January contain 29 pounds of water, while the same amount cut in April contained 38 pounds of water; 100 pounds of sycamore cut in January contained 33 pounds of water, and 40 cut in April. White pine cut in January contained 52 pounds; cut in April 61 pounds of water.—*Selected*.

Best Flour.

There seems to be a wide difference of opinion as to which flour, grinding or crushing, is the better and most economical. Of course, both systems have their champions, and it remains for the consumer alone to decide which process is the best, both from an economical and healthful standpoint, for him to use.

To present the matter in position for discussion we obtained fair samples of each process, subjected these to a rigorous chemical test, and though it is not difficult to determine which is the most profitable to the miller, there are so many points of interest and importance at stake when we consider its consumption, that we find it an herculean task to arrive at a conclusion that will place a decision beyond dispute.

The grain or seed of wheat presents a varied construction, and while one process gives us the more gluten, it shows less starch; another will show largely of both starch and gluten, and low in albumen and other elements, hence it is safe to say that for the purpose of bread-making, flour from the new process is good for certain conditions of people, and deteriorating to the health of others, and the same state of things precisely exists in the use of flour from the old or grinding process. To illustrate: Flour containing much starch and little gluten would be a poor dinner for a dyspeptic, while one with a full habit would be in misery after eating a meal of food too rich in gluten, hence as a matter of healthfulness one is equal to the other in all respects generally.

From an economic standpoint depends entirely for what purpose the food is taken—if for muscle and strength, flour from ground wheat is the better; for brain food, the coarser varieties from crushed wheat will bear the best results; if resistance to cold and dampness is the object of the consumer—sailors, soldiers, coachman and the like—there are many foods better than either, while if growth—as with children—is required, the finest flour from the roller process would be the more satisfactory.

We Americans present such varied occupations that there is no process yet known by which wheat can be made to produce flour adapted to all classes and conditions of men, but out of these products and the various means of obtaining them, a class of food may be produced that will be peculiarly adapted to the wants of all. It is to this end that we have inaugurated a series of experimental and practical tests, and in the future will give the results, but at this writing—it being so late before we were enabled to perfect the arrangements for making them—that some time must elapse before we can give all the results. In the meantime we shall be pleased to make any and all tests free, for any one who will take the trouble of forwarding samples to the laboratory, but our friends need not confine themselves to wheat, as we propose to discuss all kinds of grain used as alimentary substances.—*St. Louis Miller*.

Bean-town Blandishment.

THE MILLSTONE is the name of one of the best milling papers in this or any other country, run by David H. Ranek, whose postoffice is Indianapolis, Ind. His paper is monthly, and only costs \$1 a year, and it's cheap at that. Dave is one of the most practical jokers in the world, good-natured and enjoys a "mill" with anybody. He took in a sensible woman a couple of years ago, and he has improved wonderfully since that event. His February number introduced Louis H. Gibson, as associate editor of his journal, all of which bespeaks attention and tells of prosperity. Well, we wish David all the prosperity he deserves, and it's considerable.—*Manufacturers' Gazette, Boston*.

[For The Millstone.]

A REMARKABLE ENGINE.

J. W. BOCAGE.

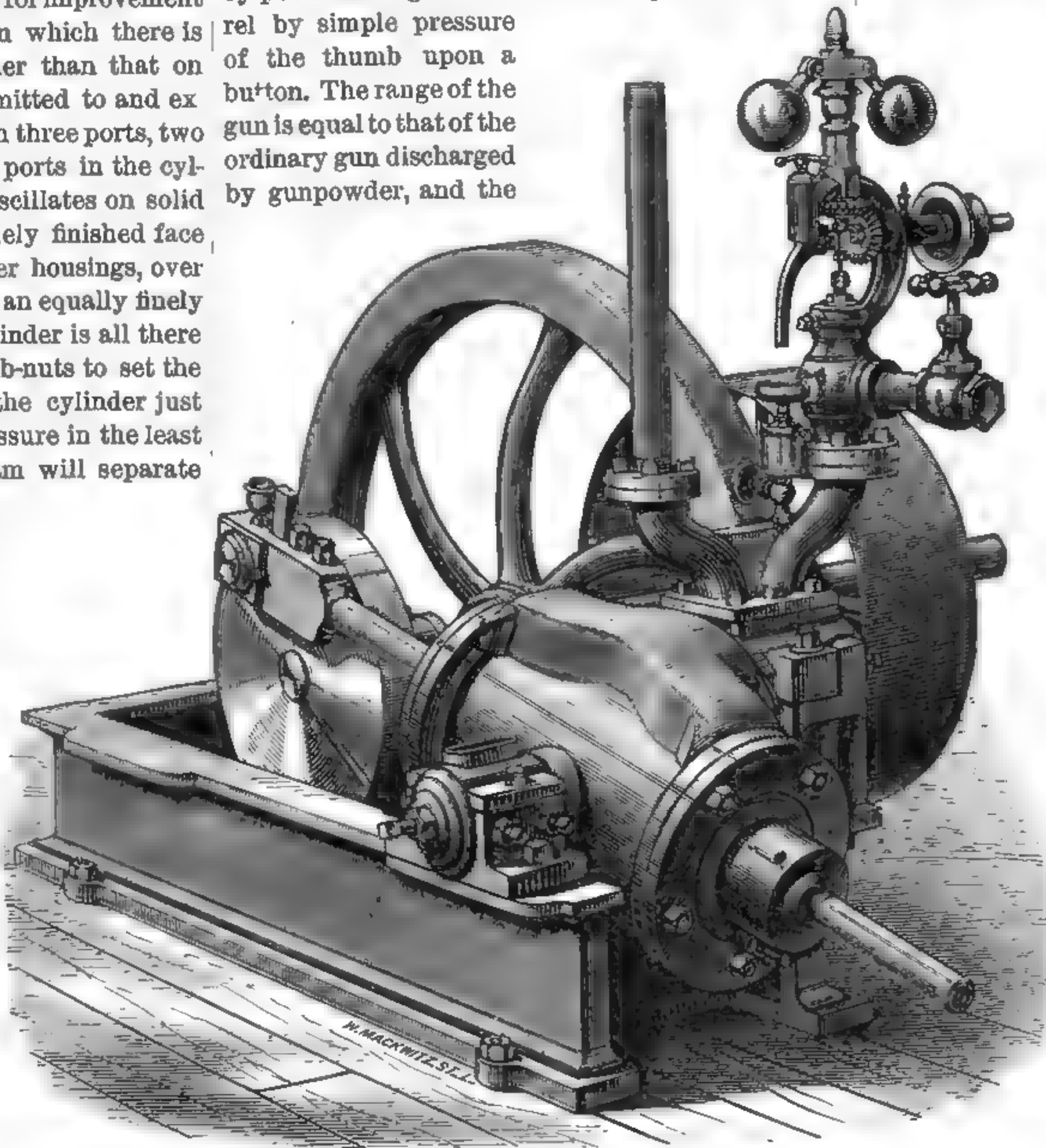
NOTICE in your March number the article from the pen of J. F. Tallant entitled "Waste of Power." After briefly describing the slide-valve engine and its operation, he says it is the most simple, cheaply built and easily managed engine in the world, and justly admits it is the most extravagant and wasteful, absorbing power wasted in steam pressure and friction. All who use steam engines daily demonstrate the truthfulness of this admission. He asks how can this vast, incalculable loss be avoided? How can 20,510 pounds pressure at 125 pounds boiler pressure on the back of a valve 10½ inches long and 17 inches wide be overcome that the value of the actual labor may be made greater than 2 per cent. of the power in fuel consumed? He says "here is a field for inventors as wide as the world and as boundless as infinite space." I beg to call attention to a patent granted to Augustus B. Wood, and issued on the 27th day of July, 1880, for improvement on the oscillating steam engine, in which there is not a pound of steam pressure other than that on the piston head, steam being admitted to and exhausted from a steam chamber with three ports, two of which are presented to the two ports in the cylinder alternately as the cylinder oscillates on solid trunnions; there is no valve, a finely finished face on the steam chamber, set in proper housings, over one of the trunnions and against an equally finely finished face on the side of the cylinder is all there is of it. With set screws and jamb-nuts to set the steam chamber up to the face of the cylinder just enough to overcome the steam pressure in the least degree, the pressure of the steam will separate the two faces instead of pressing them together, as is the case with the slide-valve, thus the great loss of power by pressure on the back of the slide-valve in this form of engine is entirely relieved. Seventy-nine of these engines, ranging from 8 to 10 horse power, now in successful operation, exhibit a minimum of friction, in fact when once the faces are adjusted, perpendicular and parallel, a slight turn of the set screws will effectually cut-off all escape of steam between the faces; no other adjustment is necessary. This engine has no slide-valve, no valve rod, no eccentric, no cam rod, or yoke, no cross-head, no slides or brasses to adjust. The piston passes through both cylinder-heads and connects directly with the crank-pin. There are 42 pieces of the slide-valve engine set aside, so the writer claims it to be the most simple, cheaply built (at least 33 per cent. less than any slide-valve) and easily managed steam engine in the world. In unskilled hands with neglectful treatment for four years, it has proved to be durable. The increase in its power cannot be questioned. This engine is economic in its construction, at least 50 per cent. of power is gained over the slide-valve with no greater expenditure of fuel; more durable, and so simple in all its working parts that the unskilled can comprehend and work it at once, and yet, for the need of money and genius to introduce it to the engine-using public, its sale is confined to a radius of 75 miles of the spot where it is manufactured. As Mr. Tallant remarks "the indifference, ignorance, conservatism, or dislike to make any radical change, with the pronounced prejudices of engineers and mechanical experts generally," are obstacles in the way of its

general introduction. The way is clear for some enterprising man in Ohio or elsewhere north of the Ohio river to take hold of it and reap a rich harvest.

[Any further particulars in regard to this engine may be had by writing to Mr. Bocage, whose address is Pine Bluff, Ark.—ED. MILLSTONE.]

A Dynamite Gun.

If the new dynamite gun meets expectations we may go to making up faces at Bismarck and all Europe without fear of the consequences. The gun, which is now being experimented with by order of the war department, throws a dynamite cartridge which explodes when it strikes with a force sufficient to destroy the strongest vessel ever built. In order to prevent exploding at the moment of firing it is necessary to avoid the shock occasioned by the use of gunpowder. The missile is therefore impelled by the force of compressed air, which is generated by powerful engines and is discharged into the barrel by simple pressure of the thumb upon a button. The range of the gun is equal to that of the ordinary gun discharged by gunpowder, and the



cartridge arrives at its destination ready for business when exploded by striking. The gun itself weighs only a ton and is therefore easily handled. They can be constructed in any well-equipped machine shop, and but small cost and little time are requisite. They may be used on gunboats, or for field guns. One cartridge exploded on the deck of the Thunderer would sink the vessel and destroy every living being upon it. A few cartridges burst in a brigade would have the effect of a powder mill explosion among the troops. So its inventors claim. As there is no explosion or flame at the discharge of the gun it can work silently in the dark without drawing the enemy's fire. A question or two as to the probable consequence should the enemy's shot fall into the midst of some of these cartridges were not answered with complete satisfaction. Until this weapon is perfected and proved, or our present navy is strengthened, it is to be hoped that our government will observe due discretion in its relations with its European neighbors.—*Exchange.*



Single leather belting, when new, weighs about 60 pounds to the foot; a strip one foot long and one inch wide weighs about 0.068 pounds.

An average cubic foot of French buhr weighs 160 pounds. A cubic foot of the plaster used in millstone building weighs about 90 pounds. There are about six cubic feet of buhr stone in an ordinary four-foot runner.

When a machine belt is run horizontally the lower part should be the driving portion, if possible, for if it stretches the loose or upper side will cover more of the pulley surface. If the upper part is the driving portion, then, as the belt stretches it will fall from the pulley, giving less contact surface.

Middlings which have passed through sizing rolls should never be sent back with the original break middlings, as is done so frequently. After having passed through the smooth rolls they are of an entirely different character from the break middlings and invite separate treatment. It is impossible to do justice to either when they are together.

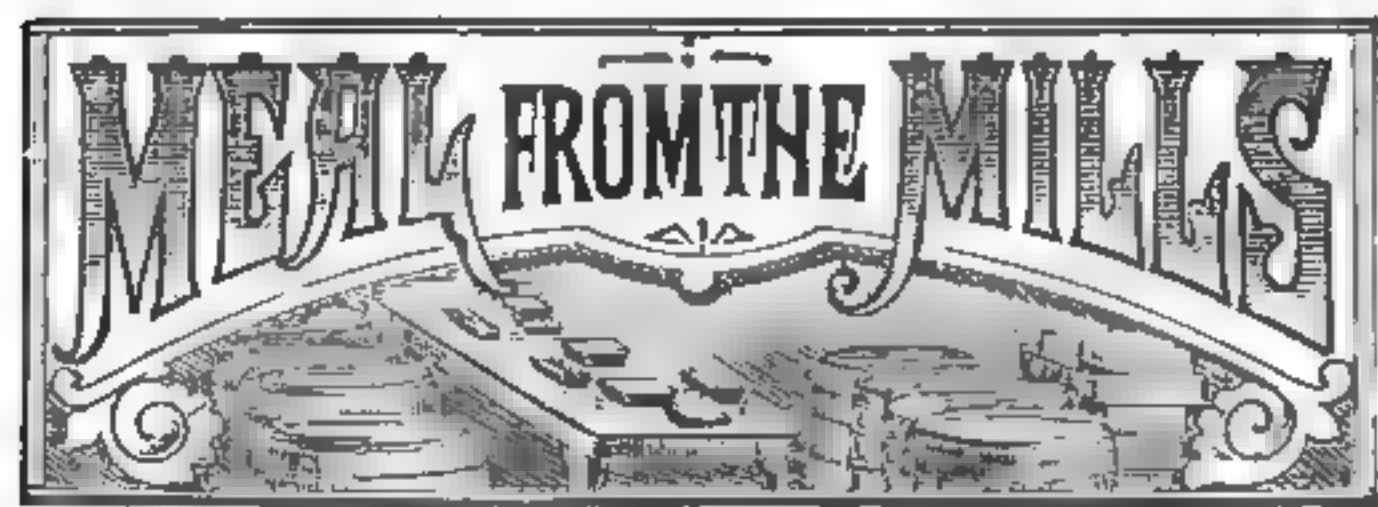
If the staff is allowed to cross the eye it will put the stones in wind, and it will take much longer to dress them and get them back into proper face again. In order to do things right a slate staff should be used, as it is far better than iron and is not so liable to warp or be affected with changes incidental to climate or temperature.

The best treatment to give damp wheat in order to secure reasonably good results is still undetermined. While rolls have not failed in this particular, it seems that the heat generated of millstone milling is better for damp wheat than the cool reduction of the rolls. The fact of the matter is, that a good deal of damp wheat is sent to reduction

apparatus which ought to receive preliminary treatment.

An experienced miller remarks that one point generally overlooked by many in dressing millstones is the adaptation of the pick to the buhr. For light work on porous stones light picks should be used, and for heavy work, such as that put upon feed stones, heavy picks. It is difficult to dress a tender buhr neatly with heavy picks, and a light pick cannot dress a hard stone in an expedient manner.

When tighteners are used on belts, they should be placed as close to the large or driving pulley as circumstances will permit, as the loss of power incurred by the use of the tightener is equal to that required to bend the belt and carry the tightening pulley. Consequently there is a greater loss of power by placing it near the small pulley, as the belt is required to be bent more than when placed near the large one.



WANT MILLS.

There is a fine opening for a 50-barrel roller mill at Gladstone, Man.

The citizens of Westbourne, Man., offer a bonus for a grist mill.

Brandon, Minn., has subscribed \$500 toward procuring a grist and saw mill combined at that place.

Webster, Dak., wants a mill; also a machine shop and foundry.

A flouring mill is wanted at Andover, Dak., says an exchange; the country will support it.

Morenci, Mich., wants a roller mill, and offers \$3,000 to any person who will construct a mill of that description in that village.

NEW MILLS.

Wm. Annesser, of Ottawa, O., intends building a large three-story brick mill this spring.

J. F. Crowl, a mill owner of Montpelier, O., will build a 75-barrel roller mill at Reading, Mich.

Minto, Dak., is to have a new 125-barrel roller mill.

DISSOLVED.

The Acme Milling Co., of Indianapolis, Ind., succeeds the Indianapolis Milling Co. The new corporation will operate both the A and B mills of the old Gibson plant.

Murray & Beardsley, operating a mill at Marquand, Md., have dissolved partnership.

Vaughn & Heaton, millers, at Ball's Ferry, Cal., have dissolved. L. V. Vaughn continues the business.

J. E. Gemmill & Co., operating a mill at Portland, Ind., have dissolved partnership, S. H. Adams now conducting the business.

Niel & Smith, operating a mill at Coon Rapids, Iowa, have dissolved partnership.

Hegner & Hoppe, millers, Foster's Crossing, O., have dissolved partnership. Mr. Hoppe continues the business.

Ellwood & Armstrong, millers, of Rochester, N. Y., have dissolved partnership.

Mr. Dennis retires from the milling firm of Dennis & Johnson, at Westerville, O.

SOLD TO OTHERS.

Parker & Co., of Fulton, Ky., have sold their mill.

Smith & Olden, millers, of Cotton Gin, Tex., have sold out.

J. & R. Longfellow, millers, at Garden City, Kan., have sold out.

Rees & Lawrence, at Center Point, Tex., have sold their mill.

Allen Hanna, of Canterbury, Conn., has sold his grist mill to Calvin Woodward.

H. Wilbern, miller, Grand View, Ind., has sold out.

T. Tome, miller, Sterritania, Pa., has sold out to Banon & Chisholm.

Alfred D. Le Carpenter, miller, Rockland, Del., has sold out.

J. W. Guernsey, proprietor of the Somerville flour mills, Somerville, Mass., has sold out to Chase & Dutch.

Rohman & Damon, millers, of Liberty, Mo., have been succeeded by the Clay County Milling Association.

ASSIGNED.

O. C. Strother & Son, operating a mill at Sulphur, Ky., recently assigned.

Goudy & Simm, millers at Maysville, O., have made an assignment.

Humphrey Brothers, millers, at South Carrollton, Ky., have made an assignment to J. P. McIntire. The liabilities are estimated at \$30,000; assets, \$10,000.

N. S. Wyckoff & Sons, millers and dealers in lumber at Stroudsburg, Pa., have made an assign-

ment to Stephen Holmes, Jr.; the liabilities are estimated at \$25,000, and assets, \$15,000.

OBITUARY.

C. Cobb, of H. K. Meyers & Co., millers, of Ashland, O., is dead.

J. W. Dieter, miller and fruit packer, at Gunpowder, Md., recently died.

Josiah Wilson, of the firm of J. C. Wilson & Co., (limited) owners of a flouring mill at New Castle, Pa., is dead.

CASUALTIES.

In Amherst county, Va., several milldams were swept away during a terrific wind and rain storm which visited that region March 25.

The boilers in Lesner Sons' grist mill at Charlton, N. Y., exploded March 14. The mill was wrecked, the proprietors killed and two farmers wounded.

The foundation of the storehouse of the Holly Milling Co., at Holly, Mich., gave way March 26. Forty tons of bran and 800 barrels of flour were dumped into the mill race. The flour was in paper sacks, and was almost a total loss. The building was built less than a year ago, but the foundations were thought to be poor by experienced carpenters.

The boiler of the Snow Flake flouring mills, at Wheatland, Ind., exploded on 1st inst., completely demolishing part of the building. Martin Bubank, the engineer, was frightfully scalded. The loss on the mill is about \$1,500.

Cline & Williams' mill at Newton, N. C., was partially destroyed in a cyclone March 26.

J. R. Van Meter's large flouring mill at Van Meter, Ia., was undermined by water and fell with a crash, the afternoon of March 22. The building and machinery, with 1,000 bushels of wheat were lost. Loss unknown.

A boiler explosion in Healy's flour mill at Blairsville, Pa., April 4, wrecked the building and seriously injured the fireman and Capt. Healy.

The boiler in the grist mill of D. P. Bathbrick, Davidson Station, Mich., exploded April 18, fatally injuring the engineer, John Miller. The miller, John Bathbrick, was slightly injured about the head. Will Hall was hurt about the face and arms. Another man was hurt about the head. The mill was wrecked.

John Almquist, a miller employed in the Goodhue mill at Cannon Falls, Minn., on the 14th inst., was caught in the gearing of a set of rolls and his left arm crushed in a fearful manner. He was extricated with great difficulty. It is miraculous that he was not instantly killed.

FIRES.

The grist mill of G. W. Adams, at Cornish, Me., was burned March 14. Loss, \$3,000; insurance, \$2,150.

In Indiana last year, 25 flour and oatmeal mills and four elevators were destroyed by fire.

According to the New York *Chronicle* there were 31 flouring, grist and oatmeal mills burned in Illinois during 1883.

The flouring mills of Dewey & Williams, also the saw mill of Wheeler & Royer, Waterford, Pa., were burned March 26. Loss on the flouring mill, \$23,000; insurance, \$11,000. There was no insurance on the saw mill.

A saw and grist mill owned by Hicks & Buckhart, situated near Wickliffe, Ky., was burned on the 11th inst., by an incendiary. Considerable lumber was also destroyed. Loss \$3,000, with half insurance.

The Parsons (Kan.) mills burned April 6. Loss, \$10,000; insurance, \$8,000.

The elevator owned by William Reed, at Hampton, Iowa, with its contents, consisting of 4,000 bushels of wheat and 6,000 bushels of oats, was totally destroyed by fire April 5. Loss, \$11,000. S. M. Alderson & Co.'s grist mill was also burned. Loss, about \$9,000. Both buildings were insured, but the amount is not known.

Pillsbury & Hulbert's large grain elevator at Long Prairie, Minn., was burned April 9. There were 5,000 bushels of wheat in the building at the time all of which was lost. The origin of the fire is unknown.

The mill of Kline, McDonald & Hall, at Horseheads, N. Y., burned recently. Loss, \$20,000; partly insured.

Comer's grist mill, on Shelby street, Indianapolis, Ind., was partly destroyed by fire on the 9th inst. The fire started in the engine-room, and the rear

half of the building was entirely burned. The loss will probably not exceed \$600, which is fully covered by insurance.

The O. K. flouring mill at Litchfield, Ill., was destroyed by fire on the 15th inst. The two upper stories were wrecked by the flames before they could be extinguished by the fire department. The building, machinery and contents were valued at \$18,000 on which there is an insurance of \$9,500. The mill had been standing idle for some days, and the cause of the fire is a mystery.

At Thrifty, near Brownwood, Tex., March 18, the flouring mills of Allen & Mullins, were destroyed by fire. The loss is about \$20,000; insurance, \$10,000. In addition to the mill being consumed there was 20,000 pounds of flour belonging to outside parties, and 7,500 pounds belonging to the mill owners.

The mill of W. H. Mitchell & Co., at Horse Cove, Ky., has been destroyed by fire. Loss, \$26,000. Insurance, \$10,000.

The frame steam flouring mill of W. H. Lane, at Milton Rock county, Wis., was totally destroyed by fire on the morning of March 20. Loss, \$12,000; no insurance. The fire is supposed to be incendiary, as there was no fire in the mill.

Thomas S. Halsey's flour mills, at Upper Chichester township, Pa., were destroyed by fire on April 3. Loss, \$4,000, with an insurance of \$2,200.

The large flouring mill belonging to David Zook, at Hagerstown, Ind., was burned on April 3. Loss, \$6,000; partially insured.

The flouring mills of Rambo Bros., at Dresden, O., was destroyed by fire on the 5th inst. Loss, \$50,000; insurance, \$35,000, in several companies.

MISCELLANEOUS.

Crop reports from foreign wheat-growing countries are generally favorable.

C. Dues & Son, proprietors of Malachite flouring mill, Malachite, Col., will build room 20x40 in addition to mill, and put in two run of buhrs.

The Eisenmayer Company, Little Rock, Ark., flour mills will rebuild, adding three stories and enlarge boiler house and put in 175 horse power boiler, and equip the mill for roller process by adding 9x24 Odell rollers, 4 Smith purifiers and 10 new bolting reels. This company received a medal at the Centennial for "the only flour that came up to the highest standard of strength and color."

The Central mills, Cobden, Ill., will this spring put in a full 100-barrel roller mill, retaining a part of the old machinery.

Flour to the value of \$295,000,000 is annually consumed in Great Britain and Ireland.

W. R. Faunce has been admitted into partnership with Geo. Shand, proprietor of a flour mill at Chico, Cal.

The new roller mill which will be erected at Mandan, Dak., this summer will be exempt from taxation for five years.

Mr. Lenks, of Grand Forks, Dak., has raised a bonus of \$1,800 and 400 bushels of No. 1 hard wheat for a flouring mill. Mr. Hughes, of Red River, will erect it.

The Board of Trade, so recently organized at Brookings, Dak., has secured for that city a flouring mill with a capacity of 200 barrels.

The Barter Mfg. Co., (not incorporated), manufacturer of middlings purifiers, Toronto, Ont., has failed.

The best Hungarian flour was quoted in the London *Miller* at 51s per sack of 280 pounds on March 17.

H. Dudley Coleman & Co., mill-furnishers, of New Orleans, La., have dissolved partnership. H. D. Coleman succeeds the old firm.

The Colorado Milling and Mercantile Company has bought out the business of A. L. Schofield & Co., flour and feed dealers, Denver, Colo.

California promises an abundant wheat crop this coming season, with largely increased acreage and a heavier yield than any previous year.

The Northwestern Milling Co., of Milwaukee, Wis., have filed articles of incorporation. The incorporators are Frederick Kuecker, William Kuecker, and Thomas Abrighton. Capital stock, \$7,500.

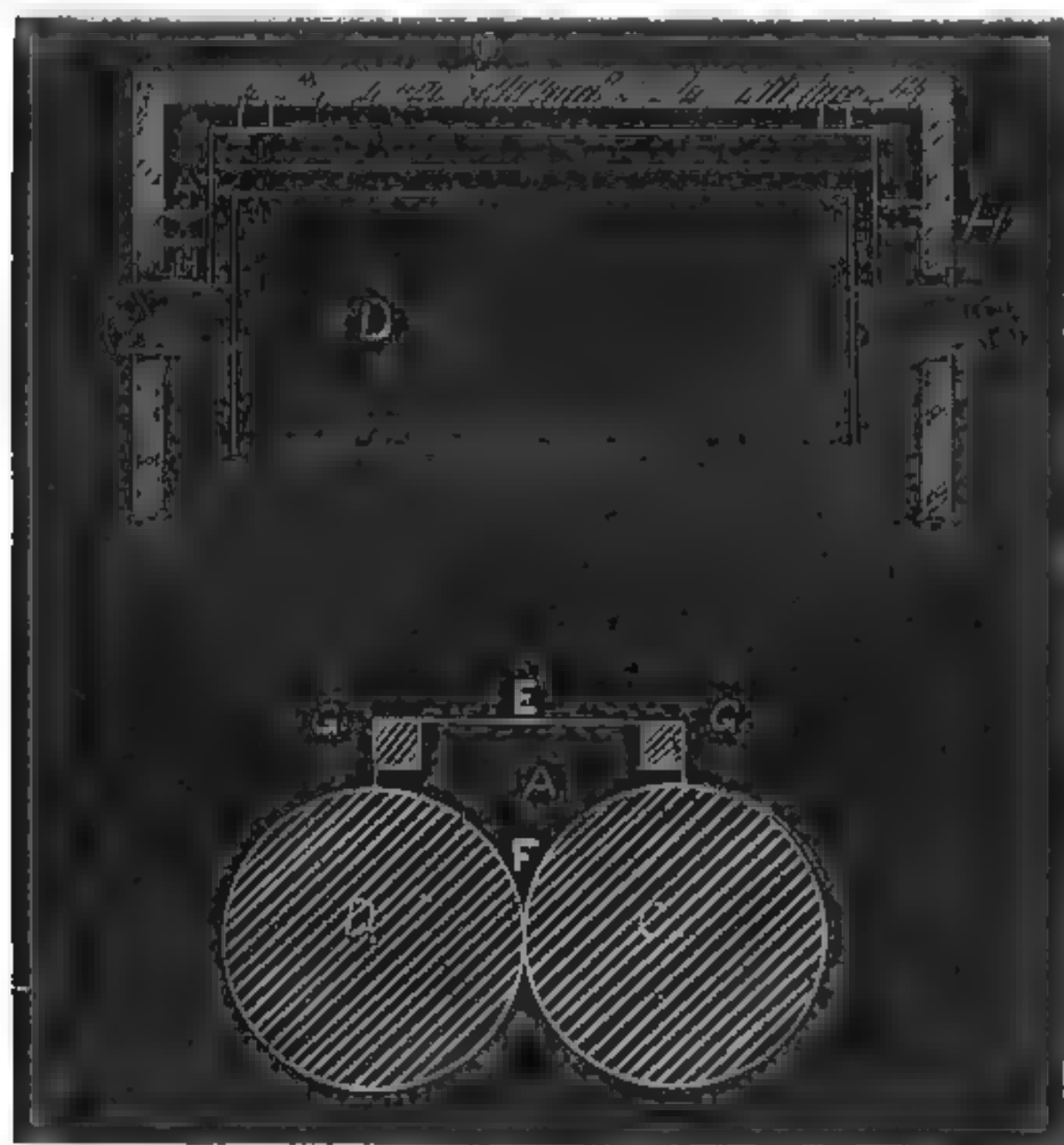
The acreage of winter wheat in Illinois is 174,632 less than last year. The condition of the crop in northern division is .90, in the central .87, and in southern division .68. The average condition of the crop in Indiana is .86, and in Ohio .84.

WRINKLES.

We shall be pleased to receive from practical men sketches and descriptive matter of any novelty in machinery, or suggestions on their methods of work, which in their judgment would be interesting to the readers of this paper. The character of these contributions may be noted by that which appears in the present number.

A Smooth Roll Attachment.

IN examining the tail of the reels which handle the stock from smooth rolls one frequently finds stock which does not appear to have passed through the reel, on the contrary is as large and sharp as it was when it went into the hopper. Of course, this may occur because of the imperfect action of the scrapers. This trouble is readily recognized and is not for consideration here. It is possible for stock to pass over the feed rolls onto the rolls themselves and yet not between them or through them, and still pass down into the lower hopper and from thence to the reel and over the tail without having been affected in the least by the rolls—not having passed between them, but rather,



as it frequently does, over the ends. This is not stock which falls near the ends of the rolls, but it will out from a distance of several inches from each end. Roll builders frequently furnish sheet metal arrangements to fit down between the rolls for the purpose of preventing this, but it soon gets bent and out of shape and is worse than useless, because it is depended upon to do something which it does not. It invites confidence and soon betrays it.

The best thing to use for this purpose is $\frac{3}{8}$ -inch hickory cut in the form indicated by *A* and placed as *A* between the rolls *C* and *D*. It should rest on the roll half an inch from each end. The grain of the wood should run in the direction *E* to *F*. Thus the ends will not be broken off as they would with the grain running crossways. These pieces *A*, should be set one at each end of the roll and connected by the pieces *G*. The top of the piece *A* at which point the pieces *G* are let into it, should extend up high enough so as to fit under the wood casing of the roll. If this casing touches this contrivance lightly, the fit between the rolls will always be a close one. The pieces *H* extend out from *A* so as to prevent the latter from moving sidewise. It should be just long enough to nearly approach the sides of the wood roll casing.

We would suggest that our miller friends look over their smooth rolls with the view of determining whether they are losing anything in the manner previously mentioned. It may be best determined by an examination at the extreme ends of the roll—beyond the point where one usually expects to find mill stock.

Pastry cooks prefer the flour of white wheat to that of red wheat.

A Coating for a Leaky Roof.

Some inquiring friends have been experimenting with coal-tar for "revamping" old roofs that begin to leak, and extending their usefulness. The difficulty, so far, is to find a cheap and effective "dryer," as the tar does not "set" between the shingles and in cracks, drips from the eaves under a hot sun, and during rains washes to cisterns, injuring the water for stock. One correspondent says: "I don't think 'body' in paint of this sort and use is of any great account; saturating the shingles with the tar so as to be measurably impervious to water, thus causing the water to run off readily and leave the roof dry, is the idea." The material promising the best results in such a case is water lime. It can be used combined with coal tar as a paint, or it can be thoroughly dusted over the surface after the coal-tar is applied. I think the best results will be secured by combining both uses as follows:

Thin the coal-tar by adding common benzine, one part of benzine to twelve of coal-tar, then stir in good water-lime—entirely freed from lumps by sifting—until you have the consistency of a strong paint, and paint this on the leaky roof, covering every part and filling all cracks. Apply at once a good dusting of water-lime to this painted surface before it dries. The water-lime retards the running of the tar, forms a hard coating by the action of the water, and conceals the very disagreeable color of coal tar. Of course fire must be kept from this paint, lest the inflammable benzine should start a combustion difficult to control. The benzine reduces the thickness of the tar, enables it to combine or mix more easily with the water-lime, makes it easier to spread on the shingles, and it soon evaporates, leaving a firm and even covering. The paint can be applied with a mop if it is moderately warm when applied.—Dr. R. C. Kedzie, Michigan Agricultural College.

A Big Bell.

The temples at Kroto, Japan, says a correspondent of the *Philadelphia Press*, are mainly of interest on account of their great bell, which swings in a monster wooden belfry, half-way up the hillside, back of the building proper. The bell is a huge brown cup, with nearly perpendicular sides and a flat crown, and, like all other Japanese bells, is sounded by means of a huge beam, kept in place by ropes, but when occasion requires brought against the rim of the bell with great force. It requires twelve coolies to manipulate this beam. Formerly it was only rung once a year, but now it may be heard two or three times every month. It is one of the greatest wonders in Japan. It is 18 feet high, $9\frac{1}{2}$ inches thick, 9 feet in diameter, and weighs nearly 74 tons. It was cast in a monster mold, in the year 1633. As the bell was cast with the rim up, the gold entering into its composition—computed to be about 1,500 pounds—sunk to the crown. It has a magnificent tone, and when struck by the open palm the vibrations may be heard at a distance of 100 yards.

Turbato.

Wood for fuel has another rival than coal, in Mexico. An article called turbato, consisting chiefly of bog peat, of which there are immense quantities, mixed with a proper proportion of bitumen, is extensively used for locomotives, stationary engines, smiths' fires, smelting and household purposes. It burns freely without much smoke, and gives a higher dynamic equivalent of heat than wood. The demand for fuel is increasing in Mexico, wood is growing scarce and advancing in value, and turbato, which is made and sold cheaper than either wood or coal, is advancing in popularity and general use.—*Northwestern Lumberman*.



The average weight of adults is 140 pounds 6 ounces.

It takes 250 bushels of potatoes to produce a ton of starch.

The average depth of the ocean is 13,000 feet; and the average elevation of the land 1,000 feet; therefore the total volume of water in the sea is 36 times that of the land above the sea.

An English naturalist asserts that the hedge-hog cannot be poisoned, neither strychnine, arsenic nor prussic acid having any effect upon it. It eats adders regardless of their venomous fangs.

The Moorish Jews evade the law which forbids them to kindle a fire on the Sabbath by putting their dinner in a jar and setting it in a hot oven Friday night. The dinner consists of salted locusts very often, but it is hot.

Dr. Carlos Finlay, of Havana, maintains that mosquitos may spread yellow fever, and reports having seen, under the microscope, spores and filaments of a particular nature on the sting of a mosquito that had bitten a yellow fever patient.

Descending into the bowels of the earth it is found that the temperature increases at the mean rate of one degree for every 45 feet. At this rate water boils at the depth of six miles, while at the depth of 60 miles the hardest rocks known to geologists are in a molten state.

A recent calculation shows that a man weighing 140 pounds and running a mile in six minutes performs work about equal to that of a half-horse engine; while a walker sustaining five miles an hour for a long day does work equal to that of a quarter-horse engine, and consumes only one-twentieth of the weight of food or fuel.

A camel can carry a ton. There are 25,000 camels in the Kuldsha and Erivan districts, Russia, The Kalmuck's have about 20,000 and the Khirgese not far from 180,000. Camels are bred for their labor principally, but also for their hair and milk. A camel will shear from eighteen to twenty-two pounds of hair. This is worth in the open market about \$2.50 a pound.

A peculiar kind of building stone is found in some localities in Oregon, having the property of being uninjured by the action of cold, heat and moisture. It is called granite sandstone, is very rich in silica, of a close, fine grain, highly crystalized, un laminated and of a fine brown color. On being brought to a white heat, and suddenly plunged in cold water, it comes out as solid and firm as at first.

The height and velocity of clouds may be determined by means of photography. Two cameras are placed 600 feet apart and provided with instantaneous shutters, which are released by electricity at the same moment. The angle of inclination of the cameras and the position of the cloud as photographed are thus obtained, and simple trigonometrical operations give the height and distance from those data.

The population of Ireland is now very nearly the same as it was in the year of the Union, 5,100,000, the great increase up to 1841, when it reached 8,199,000, having been entirely lost. But whereas in 1832, on the passing of the reform bill, Ireland had 32.32 per cent. of the population of the United Kingdom, it has now 14.81 per cent., and its electors, who were 11.32 per cent. of the whole in 1832, are now but 7.45.

Dams.

In a stream of moderate size, a form of wier has sometimes been adopted resembling the letter V, with apex or point directed up stream. If built upon piles, with a frame timber forming an inclined plane upon the face of the dam, and filled up with gravel surmounted by a mass of boulder stone, well packed in, the dam will be nearly impenetrable by water. The position of the two arms of the V distributes the force of the water in passing over, and as the currents descending from either side tend toward the center of the stream, the banks are less liable to be washed away. If timber is abundant, the frame instead of having a uniform slope downward on the face of the dam, may be made in a series of steps like a wide stairway, breaking the water into cascades. The piles for such a dam may be placed at right angles with the current, stayed and covered with plank, and made watertight with sheet piling supported by foot piles. Constructed in other respects like the one last described, a dam of this kind will possess great durability, and admit of no leakage.

An undue accumulation of water above the dam may be remedied by a channel and sluice gate in one of the side walls, by which the surplus water may be drawn off before reaching the crest of the dam. A self-adjusting dam of heavy planks strongly framed together is sometimes stretched across the stream, connected by hinges to the crest of the permanent dam, and held in an upright position by weights passing over wheels on the abutments. In case of a flood the weights give way partially to the increased pressure, and the auxiliary dam is let down toward a horizontal position, allowing the water to pass unobstructed. In place of an appendage of the kind, movable flush boards are often used, being held in place by pins and other supporters along the brink of the dam and tightly fitted to each other. In time of low water the flush boards are of important service in obtaining sufficient head. When the stream rises the boards are removed—though the supports may often remain—and the crest of the main dam being below high-water mark, the surplus water escapes freely.—*Saw Mill Gazette.*

An Easy Test for Lubricants.

The manager of any mill may, at very little expense, determine for himself all the conditions of safety and economy in lubricants as indicated by the standard of heat developed upon any given shaft. The apparatus required for this purpose is merely a thin brass tube closed at the lower end, and two thermometers. The method of using this apparatus is as follows: Place enough water in one of these tubes so that the bulb of the thermometer will be immersed; insert the tube in one of the holes in the cap of the journal, so that the lower end of the tube will be in actual contact with the shaft, hang the other thermometer free alongside, then gauge the relative heat developed with oils and with greases. Each man may thus satisfy himself as to which is best and safest.—*Unknown Exchange.*

A Wonderful River.

Some interesting and extraordinary data have just been compiled respecting the Mississippi. It has tributary streams with a total length of navigation of 16,571 miles, or about two-thirds of the distance round the world. Even this, however, represents but a small part of the navigation which will follow when the Federal government has made the contemplated improvements in the upper Mississippi, in the Minnesota, Wisconsin and other rivers, in which it is now engaged. But while the Mississippi has 16,571 miles navigable to steamboats, it has 20,221 miles navigable to barges. This navigation is divided between 22 states and territories.

We Recognize the Point.

At a microscopic exhibition in Boston lately, the sting of a honey bee was thrown upon the screen, the point of which was so sharp as to be hardly distinguishable. At the same time the finest of fine needles was shown, under the same power of the microscope, and the end of the needle measured five inches across. Said the exhibitor, "God can make a fine point, but man can not."

The Original Pony Roller Mill.

Turrianus, of whose skill so many wonderful things are related, is said to have fabricated iron mills which moved of themselves, and were so minute in size that a monk could carry one in his sleeve; and yet it was powerful enough to grind in a single day grain enough for the consumption of eight men. This is not a modern milling journal lie. It has an authentic "come down."

To Measure the Candle Power of a Light.

Measurement of the candle power of a light is accomplished by comparing the shadow cast by a rod in the light of a standard candle with the shadow cast by the light to be tested. By moving the latter toward or away from the rod a point will be reached at which the shadow cast by both lights will be of the same intensity. The intensities of the two lights are directly proportional to the squares of their distances from the shadows, i.e., suppose the light to be tested is three times the distance of the candle, its illuminating power is nine times as great.—*The Independent Record.*

Remarkable Mexican Ruins.

Some remarkable ruins, four miles southeast of Magdalena, Mexico, have of late attracted a good deal of notice. One natural pyramid has a basis of 4,320 feet square, and an elevation of 750 feet. A winding roadway leads by an easy grade from bottom to top. This is wide enough for carriages and is several miles long. In the sides of this mountain, as one ascends, he passes hundreds of chambers cut in the solid rock, with walls, floor and ceiling hewn to an even precision. These chambers vary in size from five to ten, sixteen and eighteen feet square. There are no windows, and but one entrance, which is always from the top. The height of the ceiling is usually eight feet. The walls are covered in places with hieroglyphics and figures of men and animals. It is not improbable that they are the remains of ancient Zuffi tribes.

The Thimble.

It is said that the name of this little instrument was derived from "thumb-bell," being at first "thumble," afterward "thimble." It is a Dutch invention, and was brought to England about the year 1605 by John Lofting. Formerly iron and brass were used, but lately steel, silver and gold have taken their places. In the ordinary manufacture, thin plates of metal are introduced into a die and punched into shape.

In Paris gold thimbles are manufactured to a large extent. Thin sheets of sheet iron are cut into dies of about two inches diameter. These, being heated red hot, are struck with a punch into a number of holes, gradually increasing in depth, to give them proper shape. The thimble is then trimmed, polished and indented around its outer surface with a number of little holes by means of a small wheel. It is then converted into steel by the cementation process, tempered, scoured and brought to the color. A thin sheet of gold is then introduced into the interior, and fastened to the steel by means of a polished steel mandrel. Gold leaf is then applied to the outside and attached to it by pressure, the edges being fastened to a small groove made to receive them. The thimble is then ready for use, and finds a ready market.—*Selecterl.*

Milling in Greece.

Since Abraham's time the shepherds who travel with their herds from mountain to mountain, to find food for the animals, as well as the robbers which we, even now, sometimes meet in Greece, but more abundantly in neighboring parts of Turkey, have used a hand mill which they call *Chetromylon*. The two millstones are carried by horse or donkey on all their travels along with the rest of the other necessary materials. Of course a flour produced in such a primitive manner is of necessity of the coarsest kind, and is screened only by a simple tin sieve. An oven also accompanies these people; it is as primitive as their mill, and consists of two iron plates between which the dough, simply mixed with water and salt, but without yeast, is placed and baked in hot ashes. The bread so baked is eaten with a special relish when as hot as the mouth will bear. This ancient kind of bread forms the principal food of these people. Another variety consists of a mixture of wheat or barley flour and goat or sheep's milk. This is boiled together until it forms a doughy mass, and is then thoroughly dried in the sun. So prepared it forms a very nourishing diet for children.

In the islands of the Grecian Archipelago we find a few mills operated by water power; but most of the hill tops are occupied by windmills, and upon elevated ground we often see as many as twenty of such mills in a line, which when set in motion by a favorable wind, add greatly to the beauty of the scenery. In some of the larger rivers shipmills have survived, but they grind only for the farming communities. In the principal cities we now have steam mills built upon the most approved system which supply the finest grades of flour, and as Greece is unable to produce all the necessary grain, Russia and Hungary supply the deficiency, which annually amounts to the value of several million dollars. The finest grades of flour used in Greece are imported from Australia in thousands of very small barrels, and are received with favor from year to year.—*Prof. X. Landerer, in Allgem-muehlen Zeitung.*

Rice Paper.

It is presumable that some persons suppose that rice paper, made only by the Chinese, is the product of the rice plant. It is not, however, but is made from one of the ivy family, known to botanists as the *Arabis papyrafera*, a native of China, a specimen of which can be seen in the horticultural collection, Fairmount Park, Philadelphia. In China it is said to grow seven feet high, with large terminal branches of twenty feet circumference, while drooping like magnificent plumes in regular form over the dark palmate leaves are some twelve or fourteen white panicles three feet in length. The stem seldom grows to a diameter of more than four inches, generally about two and forms but little wood, but is filled with the most beautiful white pith, and it is from this the celebrated rice paper is manufactured by the Chinese.—*Exchange.*

The Invisible Flash.

Prof. Tait, of Edinburgh, insists that when people think they see a lightning flash go upward or downward they must be mistaken. The duration of a lightning flash is less than the millionth part of a second, and the eye cannot possibly follow movements of such extraordinary rapidity. The origin of the mistake seems, he says, to be a suggestive one, viz., that the central part of the retina are more sensitive, by practice, than the rest, and that the portion of the flash which is seen directly affects the brain sooner than the rest. Hence a spectator looking toward either end of a flash very naturally fancies that end to be its starting point.



The John T. Noye M'fg Co.,

of Buffalo, N. Y., refuse to furnish reports of the sales they have made, for publication in these columns. They have taken this step in deference to the wishes of a great many of their patrons, believing that the practice, as it has heretofore existed, does not convey the impression it should.

Caldwell & Co., Cincinnati, O.

PERRYVILLE, Ind., Dec. 13, 1883.
Messrs. Caldwell & Co.

GENTS: In the summer of 1857 I covered my boiler house with your "Outcast Elastic Joint Iron Roofing," which has given me entire satisfaction. I never had occasion to make any repairs, until a few months since, the part over the escape steam gave out in a few places, so I had to repair it. I inclose you a piece of the roofing taken off. The roof was only painted twice in 26 years.

Yours truly, J. F. SMITH.

Cumner Engine Co.,

Cleveland, O., send the following items:

From the Co-operative Brewing Co., Buffalo, N. Y., two Ballentine refrigerating machines, with condensers, etc., to displace machines of another make. These machines retain the full amount of ammonia they were originally charged with, and in this respect possess a great advantage over other makes, which are wasteful of ammonia gas, and as this substance is expensive the point is worth noting. They have now five large refrigerating machines under way, all of which are ordered.

They have also received the following orders for engines:

A 12x24, 89 H. P. for Shatto & Dennis, Minneapolis, Minn.; an 11x20, 67 H. P. for Stults & Kile, Orwell, O., and an 18x36, 215 H. P., for the Amoskeag M'fg Co., Manchester, N. H.

Geo. W. Heartley, Toledo, O.

The house of Heartley & Dempsy to which Geo. W. Heartley is successor was established in 1876. Mr. Heartley is one of the oldest mill-pick makers in the country and his goods have always borne a high reputation. He has facilities equal to any demand and can fill orders promptly. Perhaps there may be makers of picks who quote lower prices, but all his picks are from special Sheffield steel and quality considered, are as cheap as any in the market. Mr. Heartley also manufactures largely, shafting, gearing, pulleys, etc., and can turn out special orders at short notice and will meet the market in prices.

W. H. Barber & Co.,

Allentown, Pa., report the following sales of Eureka turbines:

A 30-inch wheel to Jacob G. Miller, Buck Snort, Fayette county, Ala.; a 48-inch wheel to Hugo Bartz, Keytesville, Mo.; a 54-inch wheel to J. Wood & Bro., Conshohocken, Pa.; a 27-inch wheel to G. W. Fenton & Co., Frewsburg, N. Y.; a 30-inch to P. L. Shultz, Lewisburg, Pa.; a 48-inch wheel to H. S. Snively, Lancaster Junction, Pa.; a 36-inch wheel (double) to Wm. Younger, Catasauqua, Pa.; a 36-inch wheel to Edwin B. Krause, Palm, Pa.; a 36-inch wheel to Wm. Graham, Clearfield, Pa.; a 48-inch wheel to Foster Bros, Howesdale, Pa.; a 40-inch wheel to S. H. Lick, Union Forge, Pa.; a 9-inch wheel to J. K. Hubler, Mill City, Pa.; a 12-inch wheel to Jacob Heiler, Lehigh Gap, Pa.

They have also received the following orders:

From Geo. W. Engle, Hazleton, Pa.; a 10x24 engine and a 44"x14' boiler and an entire outfit of milling machinery.

From P. H. Rauch & Bro., Kelley's Cross Roads, Pa., a large amount of milling machinery.

From Gobel Bartolette & Co., Pottstown, Pa., cut gearing, shafting, pulleys and hangers.

From James H. Grover, of Princeton Junction, N. J., mill machinery.

From J. J. Scott & Bro., Lynchburg, Va., several car-loads of cut gearing, machine molded pulleys, hangers and shafting.

From F. F. Lear & Co., Lambertville, N. J., an extensive outfit for milling machinery. Also orders for mill machinery from B. I. Jennings, News Ferry, Va.; P. F. Frederick, Listonburg, Pa.;

Shick & Wamsher, Port Clinton, Pa.; Thomas Strauss, Allentown, Pa.

From Jacob Scheirer, West End, N. J. complete hoisting machinery, with a 10x24 engine and 42"x8' locomotive boiler.

From Lehigh Iron Co., Allentown, Pa., contract for hot blast pipes.

Also orders from the following parties for the improved Barber Segment Bark Mills: The Dayton Leather & Collar Co., Dayton, O.; H. L. Sparks & Son, Indian Head, Pa.; J. D. Bevit & Co., Webb's Mills, N. Y.

Griscom & Co. & McFeely,

of Philadelphia, Pa., have received orders for their facing, cracking and furrow dressing millstone dressing machines from the following parties:

Hibbard & Brook, Bridgeport, Pa.; M. B. Eshelman, Newport, Pa.; Meek, Fuiger & Co., Marissa, Ill.; S. Hartranft & Co., Philadelphia, Pa.; H. J. Marsh, Shelby Depot, Mich.; E. B. Barnes, Camp-town, Pa.; Levan & Son, Lancaster, Pa.; Murdaugh & Steenrod, St. Clairsville, O.; G. T. Thomas, Chambersburg, Pa.; Pratt & Kelley, Gaylord, Kan.; Moenning & Weltin, Quincy, Ill.; Ike Brader, Mt. Vernon, Ill.

Also the following orders for mill-furnishings:

From Richard Lott, of Bridgeton, N. J., a set of bran rolls.

From Jacob Walter, Easton, Pa., a double set of rolls with improved roll bearings and adjustments.

From J. M. Hayes & Co., Montoursville, Lycoming county, Pa., with a full line of rolls with improved roll adjustments and bearings, centrifugals, purifiers, etc., for a first-class roller mill.

From McBride & Monefair, Columbia, Pa., additional rolls, reels, purifiers, bran duster, etc.

From Enos Wetzel, Ackermanville, Pa., a double set of rolls with improved roll adjustment and bearings for bran and germ.

The Case Manufacturing Co.,

of Columbus, O., report the following recent orders:

From J. T. Brimfield, Harden, Mo., breaks, rolls, purifiers, scalpers, etc.

From Klingerhoffer & Sigg, Florida, O., two pairs of rolls with patent automatic feed.

From Jacob Wiessman, Clintonville, O., two pairs of rolls with patent automatic feed.

From G. W. Brown, Roseville, O., two pairs of rolls with patent automatic feed.

From S. M. Winger & Bros., Lincoln, Mo., breaks, rolls, purifiers, centrifugals, etc., for a full gradual reduction mill.

From A. H. Fairchild & Son, North Bloomfield, N. Y., one No. 1 double purifier.

From Slitt & Middlekamp, South Pueblo, Col., breaks, rolls, purifiers, scalpers, etc.

From Thos. B. Mosier, Springville, Mich., one pair of rolls.

From R. P. Moore, Tolona, Ill., two pairs of rolls with patent automatic feed.

From Peter Miller, Sparta, Wis., one double break machine, four pairs of rolls with patent automatic feed, centrifugals, etc.

From Richmond City Mill Works, Richmond, Ind., two pairs of rolls for G. W. Gray, Forth Freedom, Wis.

From P. W. Weist, Piney Creek, Md., breaks, rolls, purifiers, etc.

Smith & Haldeman,

Toledo, O., manufacturers of elevators and hoisting machinery, report a prosperous spring business. They have just finished compound hydraulic passenger elevators for Fred Eaton & Co., and the Hotel Madison, and two direct freight elevators for John W. Hietts' building—all the above in Toledo. They have also recently built elevators in Massillon and Mt. Vernon, O., and are filling a large order for roller coasters (a new specialty with them) for New Orleans, La.

The Lechner Mfg. Co.,

Columbus, O., report a brisk business for the past month. They have received a large number of orders for roller detachable chain belting for elevators, conveyors and driving belts. Parties contemplating the use of detachable chain or any thing in their line, will do well to correspond with them before purchasing.

G. S. Cranson & Son.

A few years ago G. S. Cranson & Son came to Silver Creek with their buckwheat shucker. The machine at the time consisted of little more than a patent, but they saw in it something that would

supply the proverbial "long-felt want," and succeeded in getting them made at the Eureka works. The demand for the shucker grew with great rapidity and astonished the inventor as well as everybody else. Desk room in the Eureka office was at first all the office room the firm needed, but gradually their wants began to expand until they were obliged to move out and establish a business place for themselves, which they have done in cozy rooms over the postoffice, where as light and convenient an office as there is in town can be found. The machine is still made at the old place, and if the pancake crop is not a failure, the Cranson shucker will have another boom this year.—*Silver Creek Local.*

SPECIAL NOTICES.

Advertisements under this head, in large type, 20 cents per line, or in boldface letter 30 cents per line, each insertion.

Persons writing in answer to advertisements are requested to mention this paper. By so doing you will benefit both the advertiser and the publisher.

WHEELS FOR SALE.

Second-hand, of several makes and sizes. If new wheels are wanted, the Flenniken Turbine is the best in the world to buy. Send for new catalogue. Address FLENNIKEN TURBINE CO., Dubuque, Iowa.

BOLTING CLOTHS.

Millers will consult their own interests to write for prices on Bolting Cloths to G. R. GALE M'FG CO., Cleveland, O., if they want the best quality of Cloth at the lowest prices.

SPECIAL NOTICE.

Authors desiring to publish, or book-buyers wanting books on any subject, can obtain full particulars by addressing Challen's Bureau of Literary Information, 744 Broadway, New York.

FOR SALE OR EXCHANGE.

A valuable U. S. Patent (No. 281,115, dated July 10, 1883), for a machine for the thorough cleaning and grading of wheat for grinding. If can't pay cash will exchange it for good property of any kind, not incumbered, but prefer a good water-power mill located in a valuable timbered country, convenient to good flour, meal and lumber markets. Patent is worth, in the estimation of competent judges, at least \$20,000. My reason for selling is the lack of money to manufacture. Will give good bargain. For further particulars address, D. P. MORTIMER, Rexburg, Essex county, Va.

NONE BUT FIRST CLASS GOODS.

In Watches, Jewelry and Silverware one should have the best or none. Messrs. SHURLY & Co., Chicago, are making a specialty of fine goods, and if you need anything in Watches, in dust and water proof cases, Solid Silver or Triple Plated Ware, Solid Gold or Rolled Gold Jewelry, send to SHURLY & Co., they will send a single article at the dozen price. They are vouched for and indorsed by the United States Express Co., American Express Co., Southern Express Co., F. W. Palmer, Postmaster of Chicago, Gen'l John C. Smith, ex-State Treasurer, and many others. Goods sent on approval, with privilege of examination, enabling you to do your purchasing at home. Remember, Shurly & Co., 77 State St., Chicago, Ill. SEND FOR THEIR NEW AND BEAUTIFULLY ILLUSTRATED CATALOGUE.

J. R. RYAN & CO.,

→ GENERAL ←

Commission Merchants,

Flour, Grain, Feed, Hay, Etc.

Registered warerooms for the storage of Flour etc. Nos. 62 and 64 East Maryland Street, Indianapolis Ind.

FOR SALE, WANTED, ETC.

A Partner Wanted,

With a capital of from \$7,000 to \$10,000 to take a half interest in the City Mills (see advertisement in February MILLSTONE) and to improve one of the best water privileges in North Missouri, within 400 yards of City Mill; a good dam and forebay already in. The mill was destroyed by wind storm last summer. A 56-inch Leffel wheel and other machinery good. A bonus of \$2,000 can probably be raised. Do not wish to sell more than a half interest in water privilege without selling City Mill. For further particulars address GEO. GRAHAM, Trenton, Mo.

P. S. Power could be transmitted to City Mill by rope.

Who Wants to Buy Without Money?

A No. 1 flouring mill, situated in one of the best counties in Central Illinois. Good large 8½-story frame building; engine room brick with metal roof; 60-horse power engine and boiler; break machine and brush scalper; four-run of stones, cleaners, purifier, bolts, etc., all in first-class order. Will take half of its value in farm land either improved or unimproved, or will take stock of merchandise at fair valuation, balance of deferred payments on mill. Price of mill low down. Mill is situated in county seat; no other mill in county. Nice town and splendid society. A rare chance for the right man to make his "mule load of money." Describe the property you wish to trade and address "P," care of THE MILLSTONE, Indianapolis, Ind.

Undivided Two-Thirds Interest for Sale.

In the Kellogg (Iowa) steam mill. This mill has within the last thirty days been changed over to the gradual reduction system of milling. The improvements consist of two Garden City reduction mills, two brush scalpers, one wire scalper, one pair of Allis' double rolls, one corrugated for bran, one smooth for germ, one pair 40-inch French Buhrs for third break, one pair 40-inch French buhrs for middlings and one 20-inch buhr for middlings, new bolts and new bolting cloths on old reels, three purifiers, one a French the other a Garden City, one centrifugal reel, and one pair of 30-inch buhrs for corn. The mill is equipped so that we can make three different grades of flour and clean up as we go. The mill has all it can do, is located in a live town of 1,800 inhabitants. A No. 1 location for milling. Can get all the wheat the mill can grind delivered at the mill door. Address A. E. C., care of THE MILLSTONE, Indianapolis, Ind.

Machinery for Sale.

Three pairs 36-inch new stock, French buhrs, furrowed with sun, fitted with drivers, bushes, and runner balanced. Are nice for spring wheat grinding.

Two pairs 48-inch, new stock, French buhrs, with same fixtures as above stones. Are nice close, even stones, and for hard wheat are just the thing.

We offer the above stones at about one-half list prices. They must be sold soon, and this is the chance to get some good stones cheap.

Also the following machinery, all in good order, at less than one-half price.

One No. 2 Eureka Smutter, long scourer, with shoe, against sun. List price \$210.

One No. 0 Silver Creek smutter, with shoe, with sun. List price \$125.

One No. 2 California separator, only. List price \$125.

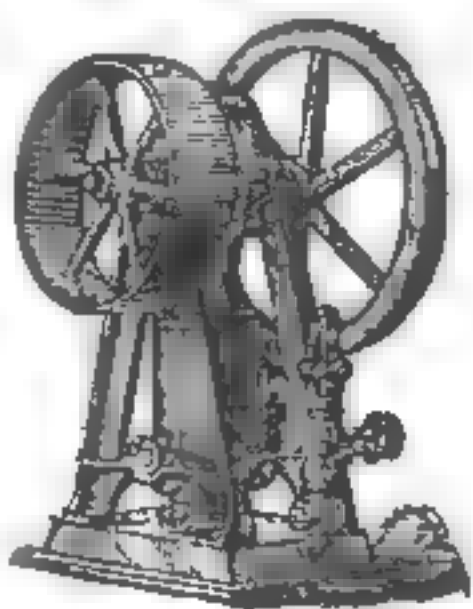
One No. 2 Eureka smutter, with sun, with shoe List price \$190.

One No. 3 Silver Creek smutter, with sun, with shoe. (Was used one month only.) List price \$240.

One Taggart style roller packer. List price \$80.

Six sets of Stevens four-roller mills, new, direct from the factory, special bargain offered.

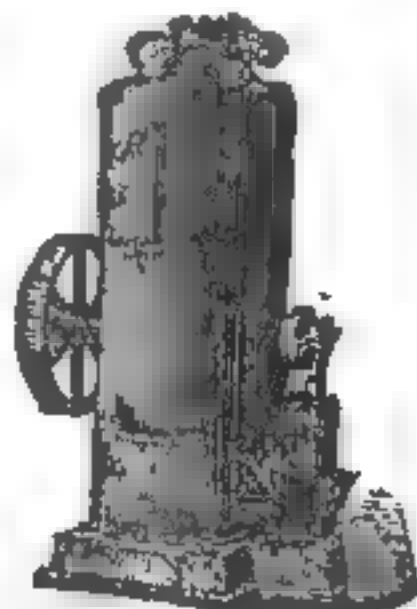
Several hundred feet of wood conveyors in boxes with flights and gudgeons set; all good as new, at 65 cents per foot less discounts as above. Address NORDYKE & MARMON CO., Indianapolis, Ind.



THE KRIEBEL ENGINES.

Simplest and Cheapest First-Class Engines on the Market. 2, 3, 5, 7 and 9 Horse Power, Semi-Portable and Stationary. Send for Descriptive Catalogue. Please mention THE MILLSTONE.

RICE, WHITACRE & CO., Chicago, Ill.



THE MILLER CO.,

Manufacturers of the

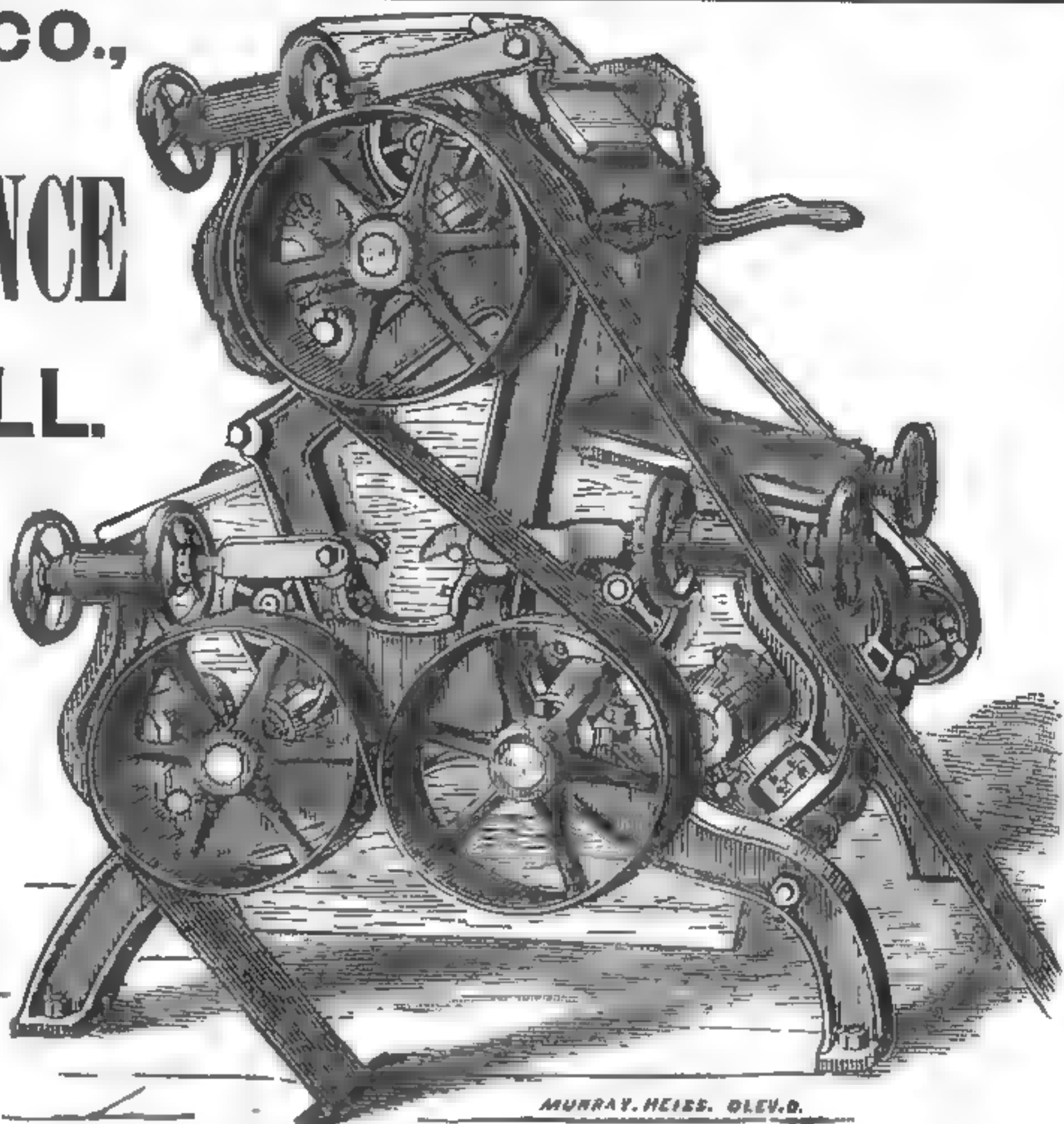
CROWN PRINCE
ROLLER MILL.

[Three Sets, or Six Rolls,
in One Frame.]

—AND THE—

RIDER WHEAT BREAK.

We make a specialty of altering stone to gradual reduction system, with a minimum amount of low grade. Send for circular and reference relative to the Rider System.



MURRAY, HEISS, GLEV. D.

THE MILLER CO., Canton, O.



WELCH'S WHEAT HEATER.

With Steaming Attachment.

FIRST PREMIUM AT MILLERS' INTERNATIONAL EXHIBITION.

Its Superiority Over All Others Fully Established.

HEATS EVERY GRAIN OF WHEAT EVENLY AND THOROUGHLY. WE GUARANTEE SATISFACTION OR NO SALE, AND INVITE A TRIAL OF 30 DAYS TO PROVE OUR CLAIM.

Dear Sir: Inclosed please find N. Y. draft to cover your bill for Wheat Heater. We will not need the second Heater as this one does the work very satisfactorily.

Yours very truly, J. W. DENIO & CO

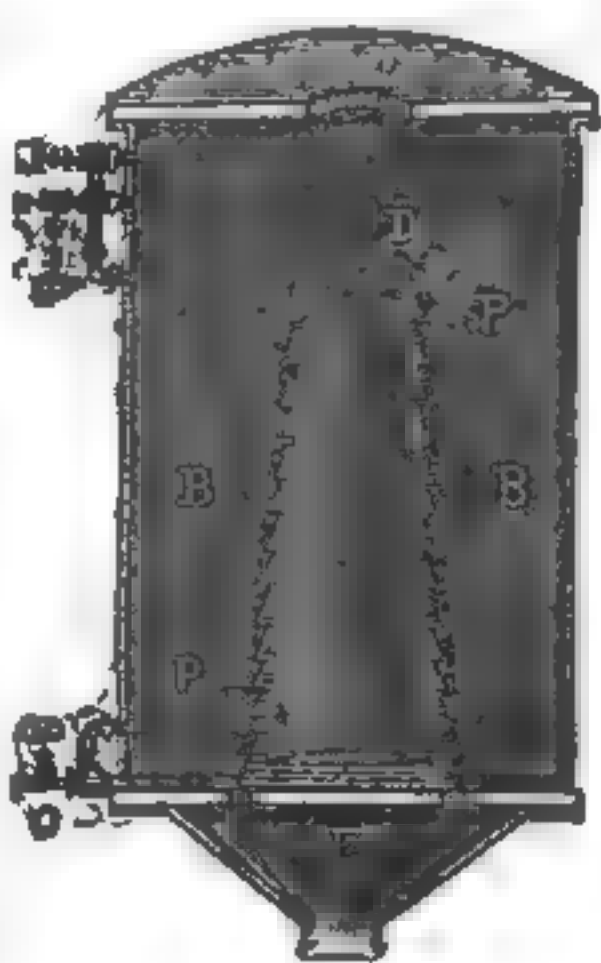
Among others, Conger & Shackelford say, under date June 22d: "We are very pleased with the Heater. It has raised our flour at least one grade."

This Heater infringes on no patents, and the manufacturer will protect all purchasers against the claims of so-called "process" patents. We are manufacturing a heater of large capacity for roller mills. For particulars address

A. B. BOWMAN,

800 North Second St.,

ST. LOUIS, MO.



Belt and Mill Supplies.

FOR SALE, WANTED, ETC.**Partner Wanted.**

The proprietor of a good custom and merchant flour mill would like to correspond with a practical miller with a view to a partnership, or would sell mill entire. Address H. B. M., P. O. Box 59, Bardstown, Ky.

An Employee Recommended.

We want a situation for a young man who has been in our employ for three years. Would say any one wanting a good custom or second miller will do well to write us. State wages and kind of mill. Address R. B. & F. G. DAVIDSON, Boles P. O., Franklin county, Mo.

New Steam Flouring Mill for Sale.

Three story iron roof brick mill building and brick iron roof engine building. Engine and machinery all new and of the most modern and improved makes. In the best town and wheat county in the state. Will sell one-half or the whole. For further particulars address JOSEPH N. TULEY, Carrollton, Mo.

One-Half Interest for Sale,

In a Western water mill and 116 acres of land, two dwelling-houses, etc. Plenty of water. Thickly settled farming country, and no other custom mill near. Low down. Part or all cash. If sold soon may take part in trade. Requires but little capital to operate. Call on or address at once J. M. BINNS, Jefferson, Union county, Dakota.

For Sale, or Will Rent.

A five-run custom and merchant steam and water mill at Linwood, Neb. Mill always crowded with custom work, and flour giving good satisfaction. Will sell one-half interest to a practical miller on easy terms, or will rent. Correspondence solicited. Address F. C. JOHNSON, Linwood, Neb.

A Nebraska Mill for Sale.

A three-run water-power grist and merchant mill, with all the latest improvements in stone milling, 90 acres land, a good frame house, located in the best wheat growing section of Nebraska. Machinery built by Nordyke & Marmon Co., to whom you are referred for description of mill, terms, etc. Address NORDYKE & MARMON CO., Indianapolis, Ind.

One-Half Flouring Mill Given Away.

I will sell my steam flouring mill at one-half its real worth to a proper person, or will sell the machinery and engine and keep the ground and building, or will sell mill machinery and engine separately. I am getting old and wish to retire. Machinery is new improved and in excellent order. For list of machinery, price and terms, address JESSE HIATT, Peru, Iowa.

For Sale at a Bargain.

A four-run new process flour mill in Harlan, Iowa. A live town of 2,400 inhabitants. Located on a branch of the Chicago, Rock Island & Pacific railroad, and in the midst of the finest wheat-raising section in Iowa. Machinery in good order; Nordyke & Marmon Co.'s make. Reason for selling, no capital to work on. Will trade for good farm land in Iowa or Missouri. Address H. HURST, Harlan, Iowa.

Mill for Rent.

Valuable flouring mill belonging to an estate, to rent for five or more years, located on the Erie canal in the city of Lockport, N. Y. The mill and large warehouse are of stone, substantially built, having seven run of stone and all necessary machinery. Ample room for rollers. Two railroad depots contiguous. Superior water power with Leffel turbine running the mill. Terms very moderate. Apply to L. A. SPALDING, Lockport, N. Y.

For Sale Cheap.

One Bran Cleaner.
One Hunter Purifier.
Two Eureka Flour Packers.
One Richmond Brush Smutter.
One Richmond 150 Bushel Separator.
One Throop Smutter.
These machines taken out of mill to put in those of larger capacity. THORNTON & CHESTER, National mills, 212 Erie street, Buffalo, N. Y.

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A flour, corn, chop and saw mill, doing a fine custom business. In thorough repair; machinery new; turbine water wheel. On a never-falling river, boats from the mill to market; rock bottom. Miller's house, storehouse, blacksmith shop, stable, corn house, etc., and 10 acres of rich land fenced into hog lots. One-half cash, balance on time, or will take city property in part payment. Address R. L. TRITTON, Lodore P. O., Amelia county, Va.

For Sale.

A new process flouring mill with unfailing water power. The machinery consists mainly of 1 Leffel water wheel; 1 break machine and scaler; 2 48-inch wheat stones; 1 48-inch corn stone; 1 36-inch middlings stone, with all the latest improved bolts, purifiers, cleaners, brush machines, etc., required for a first-class new process mill upon this system. The mill was built new within the last two years, is located in the town of Milton, Ind., having a population of 1,500, two railroads and four turnpikes. It is for sale on accommodating terms. NORDYKE & MARMON CO., Indianapolis, Ind.

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SHULTZ BELTING COMPANY

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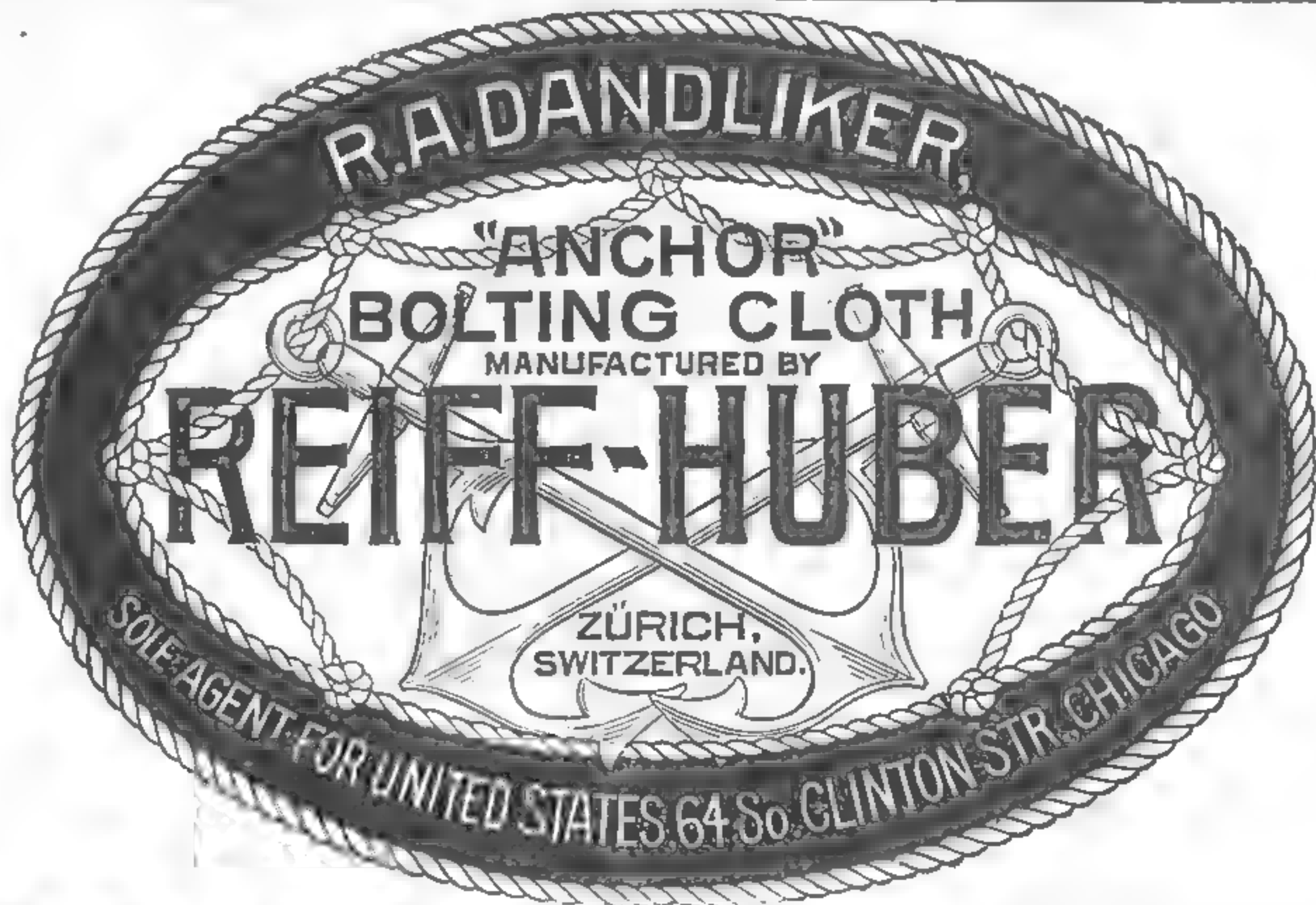
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Our BELTING is made of Leather tanned on the surfaces only; the interior (which is the Fibre and Strength of the hide) is not tanned, but Rawhide fulled and softened by our patent process. Our belting is more pliable, and hugs the pulley better, and transmits more power than any other belt. It does not pull out at the lace holes or rivets. It stretches less than any other belt. It works equally well for the largest driving belts or for the fastest running machinery and smallest pulleys. Our LACE LEATHER is made of rawhide, by our patent process, without any tanning, and is stronger and will wear better than any other. We also make the best Pieker Leather and Belt Grease in the country. Satisfaction guaranteed. Specifications of railway companies solicited.

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MILL PICKS.

Made of the very best double-refined English cast steel. All work guaranteed. For terms and warranty, address: **GEO. W. HEARTLEY**, No. 299 St. Clair Street, Toledo, O. Send for Circular.

N. B.—All Mill Picks ground and ready for use (both old and new) before leaving the shop. No time and money lost grinding rough and newly dressed Picks. All come to hand ready for use.

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And Machine Jobbing.

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Advertisements of "Mills for Sale," "Situations Wanted," etc., will be inserted under this head for fifty cents each insertion, for anything less than seven lines; over that and less than twelve lines, seventy-five cents; each additional line over twelve, five cents per line. Terms, cash in advance. *No business cards admitted under this head.*

To Exchange.

Improved farm for water-power mill property. Give full description, valuation, etc. Address **D. A. BANTER**, Kewanee, Fulton county, Ind.

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As first or second miller, in a good full roller mill. Can give best of references. Indiana or Illinois preferred. Address **S. H. E.**, Box 216, Fairmount, Ind.

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Upon easy terms, a three-run mill, on a good railroad. Possession can be had at short notice. Address or apply to **GEO. H. MOORE**, Cerro Gordo, Platt county, Ill.

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A splendid water power on the best milling stream in Nebraska. In a thriving town and a booming country. For particulars address at once **M. L. HOLMES**, Holmesville, Neb.

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In a steam flouring mill for sale to a competent miller with some money. Mill has been recently repaired and is in first-rate condition. Address **ISAAC W. STANLEY**, Glenwood, Mo.

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I will sell one-half interest, or the property entire, of my first-class mill. Term, half cash, balance in good land in fine locality. Address **J. M. TROUTMAN**, Yountsville, Montgomery county, Ind.

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A good two-run steam mill situated in Carthage, Hancock county, Ill.; will sell one-half interest to a good miller. The mill is in good running order. Address **J. H. WOLFE & SON**, Carthage, Ill.

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A good three run steam mill, located in a good wheat country, near railroad, with switch running to the mill, all in good order, with all necessary improvements for making flour and doing custom work. Address, **MRS. JANE NAUGLE**, Atherton, Vigo Co., Ind.

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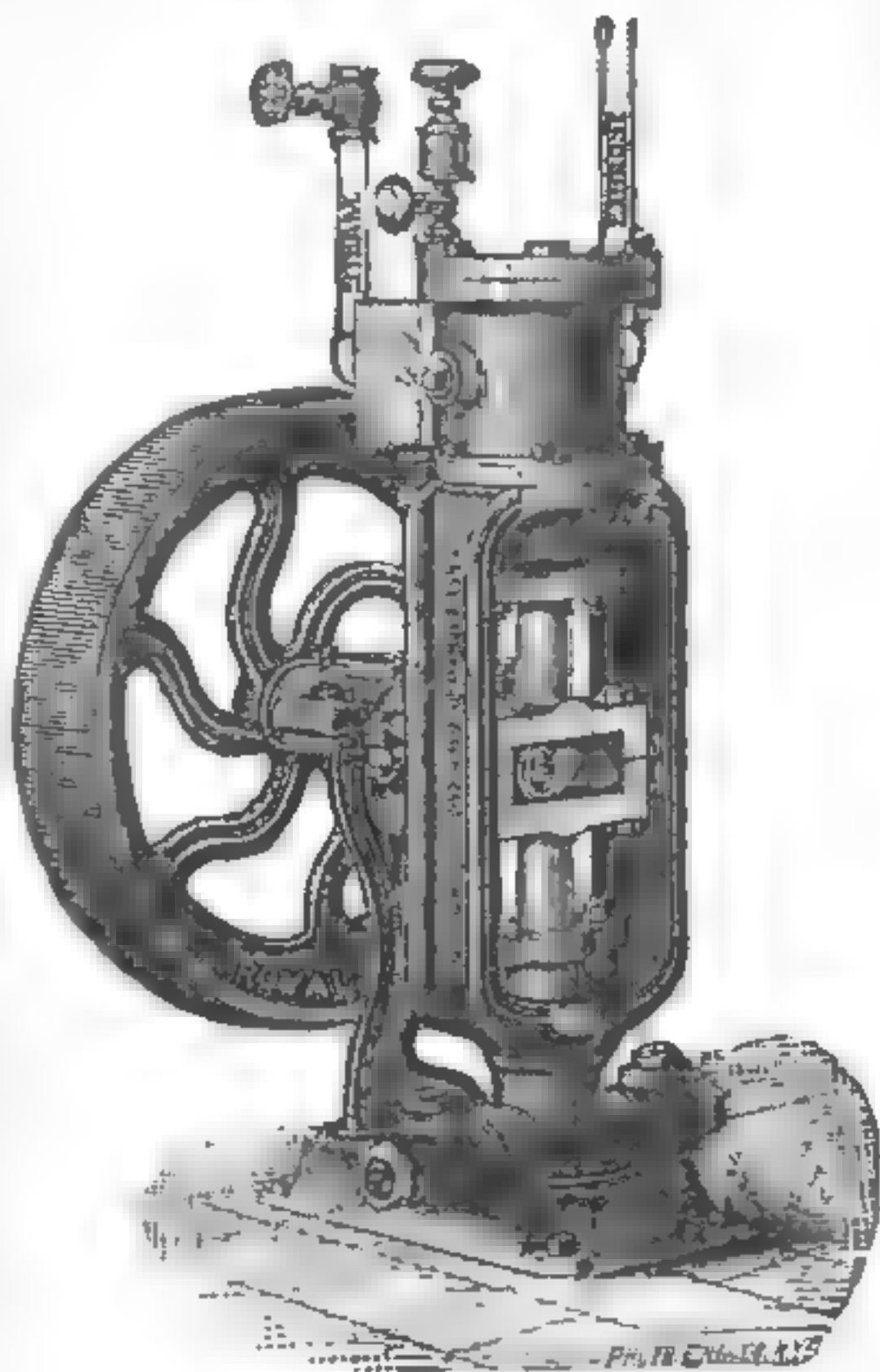
Situated on the St. Louis & San Francisco railroad, in one of the best wheat sections of the West, in a thriving young town, with the prospect of a cross railroad and the county seat. Price, \$5500. For particulars address **PRATHER & SON**, Altamont, Labette county, Kan.

\$10,000 of Real Estate for \$5,500.

Flour and grist mills, with saw mill attached. All complete and in good running order; doing business now. Wheelwright's shop, miller's house, store house, etc. Fifty acres of fine bottom land. No reasonable offer refused. Address **D. BUCHANAN**, Goldsmith, Petersburg, Va.

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Steam flouring mill for sale in Emporia, Kan. Brick building 36x47; engine room 20x30; 40 horse power; 1 break machine; 5 pairs of buhrs; 2 scalping and 6 flour reels, etc. Mill nearly new. Flour, feed and grain store in connection. A good opening for the right man with some money. For particulars call on or address **THOS. ARMOR**, Prop., as above.

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*Steam Boiler Feed Pumps,**Rotary Power Pumps,*

AND ALL KINDS OF

CISTERN, WELL AND FORCE**PUMPS**

Adapted to every kind of requirement for both Hand and Power use. *Send Catalogues sent on application. Correspondence solicited.*

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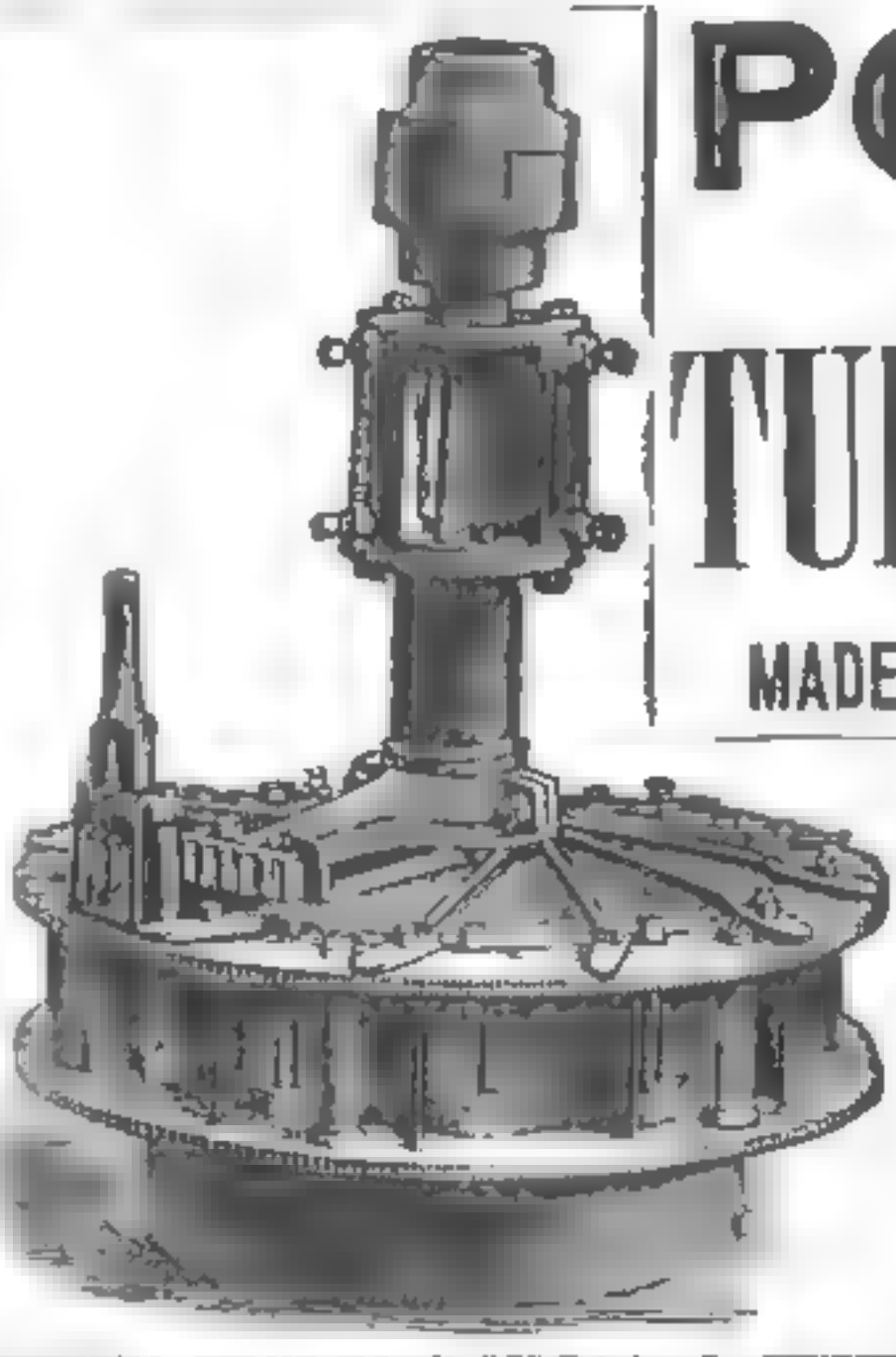
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TURBINE WATER WHEEL!

MADE OF BEST MATERIAL AND IN THE BEST STYLE OF WORKMANSHIP.

Machine-Moulded Mill Gearing,

From 1 to 20 feet diameter, of any desired face or pitch, moulded by our own Special Machinery,

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Steam Engines, Boilers, Mixers and General**Outfits for Fertilizer Works.**

Shipping Facilities the Best in All Directions.

POOLE & HUNT, - Baltimore, Md.*N. B.—Special attention given to Heavy Gearing.***SWARTWOUT'S TURBINE WATER WHEEL!**

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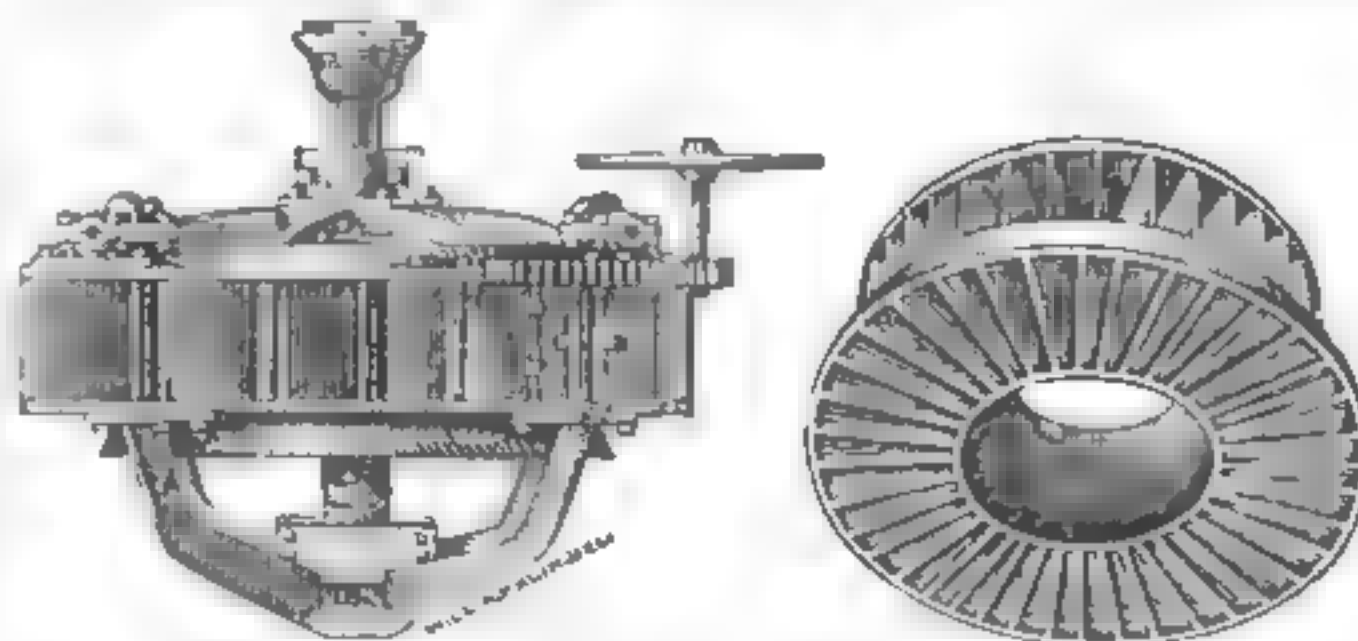
A Water Wheel that will give more power (other conditions being equal) according to the water used than any other wheel made.

It is provided with an adjustable throat, so as to give the power required, from a quarter to a full throat. **Sent on Thirty Days' Trial.**

Send for price.

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**FRANK M. DELL,****COAL, COKE and LIME,**

Cement, Plaster Paris, Lath, Hair, White Sand, Sewer Pipe, Patent Chimneys, Fire Brick and Clay

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MANUFACTURERS FLOUR SACKS.

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WM. O. DeVAY, Agt. Send for Prices.

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In order to reduce stock, we will give SPECIAL CASH DISCOUNTS on Belting, Elevator Cups and all kinds of Mill Supplies.

Secure Your Bargains Now!

Millstones, Buhr Feed Mills and Middlings Mills at cost.

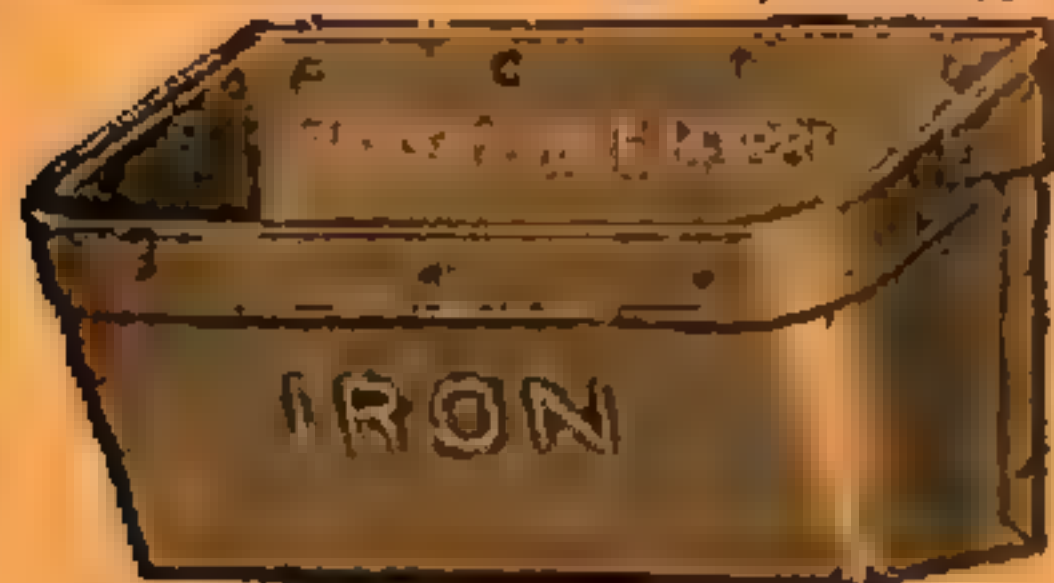
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Mill Furnishers and Bolting Cloth Importers,
Dayton, Ohio.



THE "BOSS" Elevator Cup

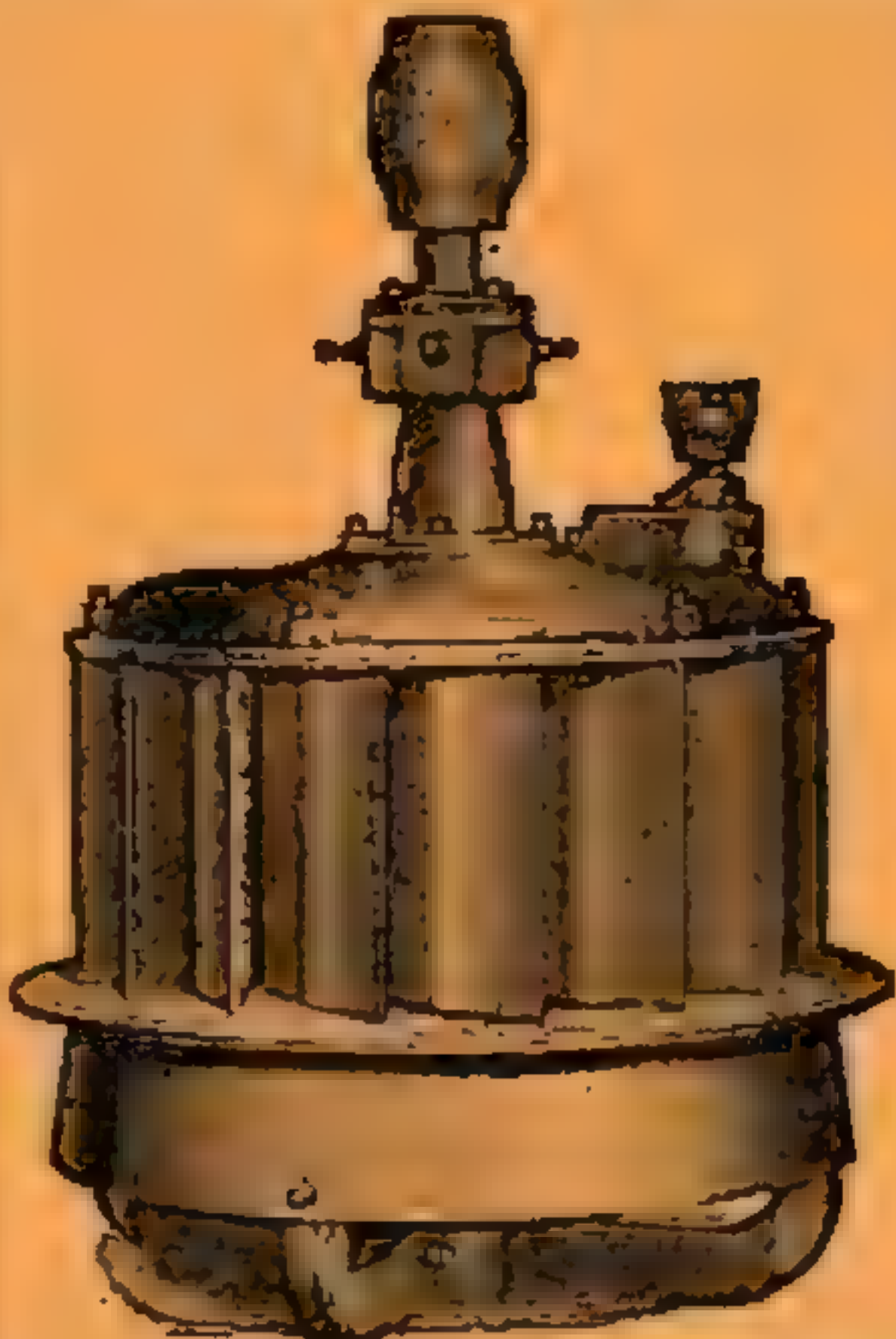
Is gaining favor every day. Over 13,000 sold in one day in three different states. My capacity in my new shop is 6,000 per week. I carry 30,000 in stock and can take care of any size order.

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DUTCH MET ANKER
BOLTING CLOTH
IMPORTED
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Such results should command the attention of discriminating buyers.

We also continue to manufacture and sell, at low prices, the

Eclipse Double Turbine,

Widely known as a thoroughly reliable wheel.

State your requirements, and send for Catalogue to

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Scientific test at Franklin Institute shows slipage of belt to be 15 per cent. less than on cast-iron pulley.

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Manufactured and sold by us in all parts of the country, from Texas to Minnesota for the past **EIGHTEEN YEARS.** Boxed ready for shipping. **ORDERS Promptly Filled.** Caldwell & Co., 130 W. Second St. CINCINNATI. Send for Circular.



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GRAIN SEPARATORS, SMUTTER CASES.

and all purposes to which it is applied in Mills, Elevators, and Warehouses.

For Catalogue and Prices, address
THE ROBERT AITCHISON

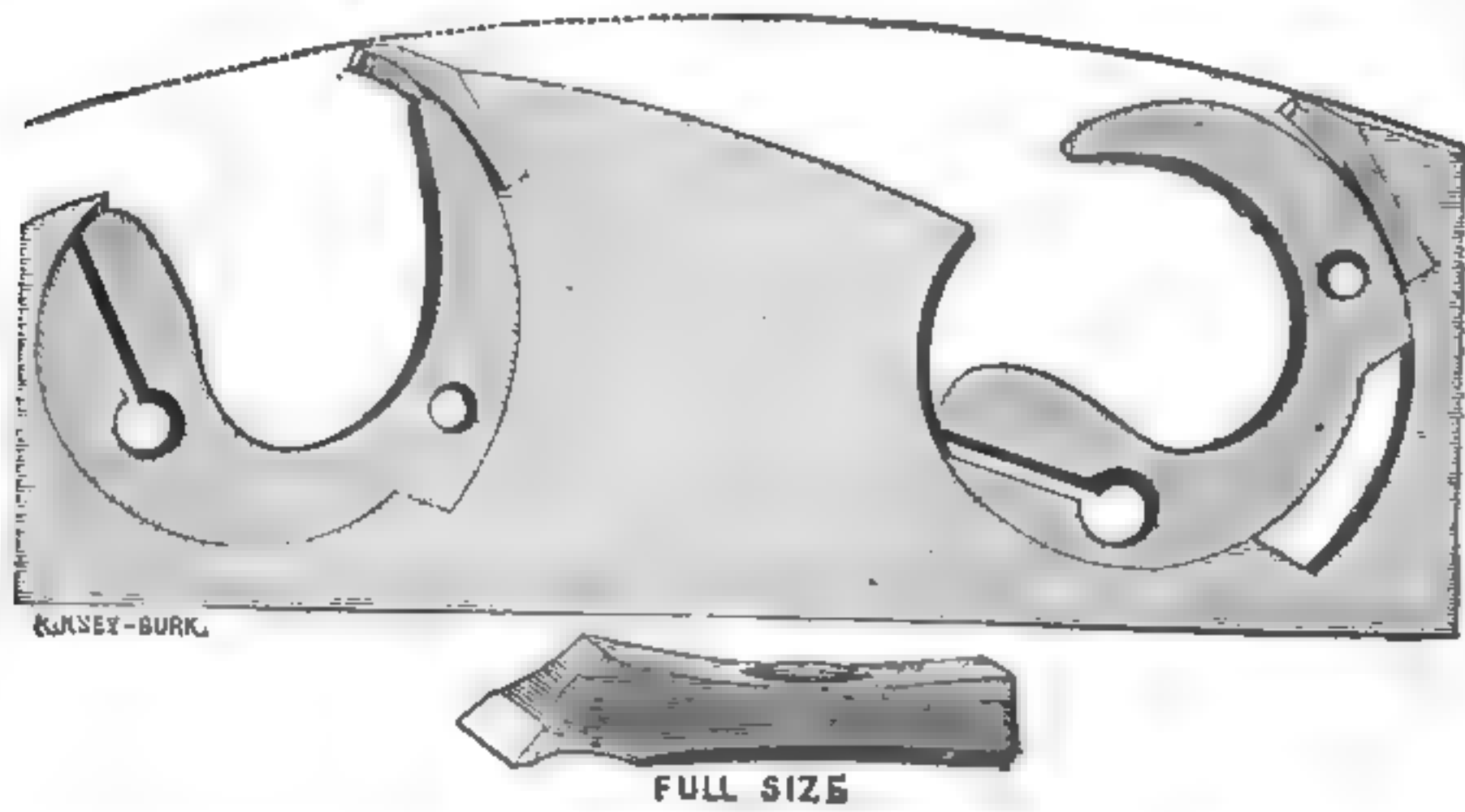
Perforated Metal Co.,

292 and 294 State-st.,
CHICAGO, ILL.

PERFORATED METALS.

Incorporated 1879.



Champion Chisel Tooth.

Patented August 5, 1879 and October 25, 1881.

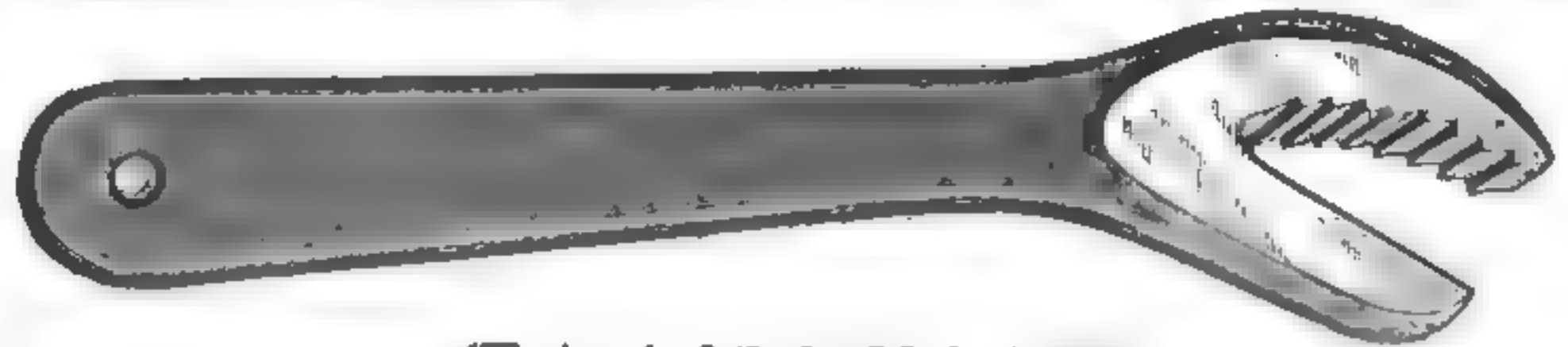
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MANUFACTURERS OF
EVERY VARIETY OF SAW USED IN A MILL.
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(Patented July 10th, 1883.)

In this improved wrench the curved toothed jaw, in combination with the straight, flat jaw, gives certainty in the hold of the teeth upon the iron, and great range in sizes of pipe and round iron, upon which a single tool can be used without adjustment. Forged from best refined iron, with tempered steel jaws.

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INSERTED TOOTH CIRCULAR SAWS OUR SPECIALTY.

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Sole Manufacturers of the New Lacing

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Also Manufacturers of

Superior
Leather
Belting.for
Circular.**STANDARD BELTING**

Is made from Butts of best tannage, and uniform in quality.

CLAIMS:

1. Leather of a superior quality.
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This Extra grade very choicest and our leather, and is We guarantee it to in the world.



is made from the very heaviest of strictly short-lap. have no superior

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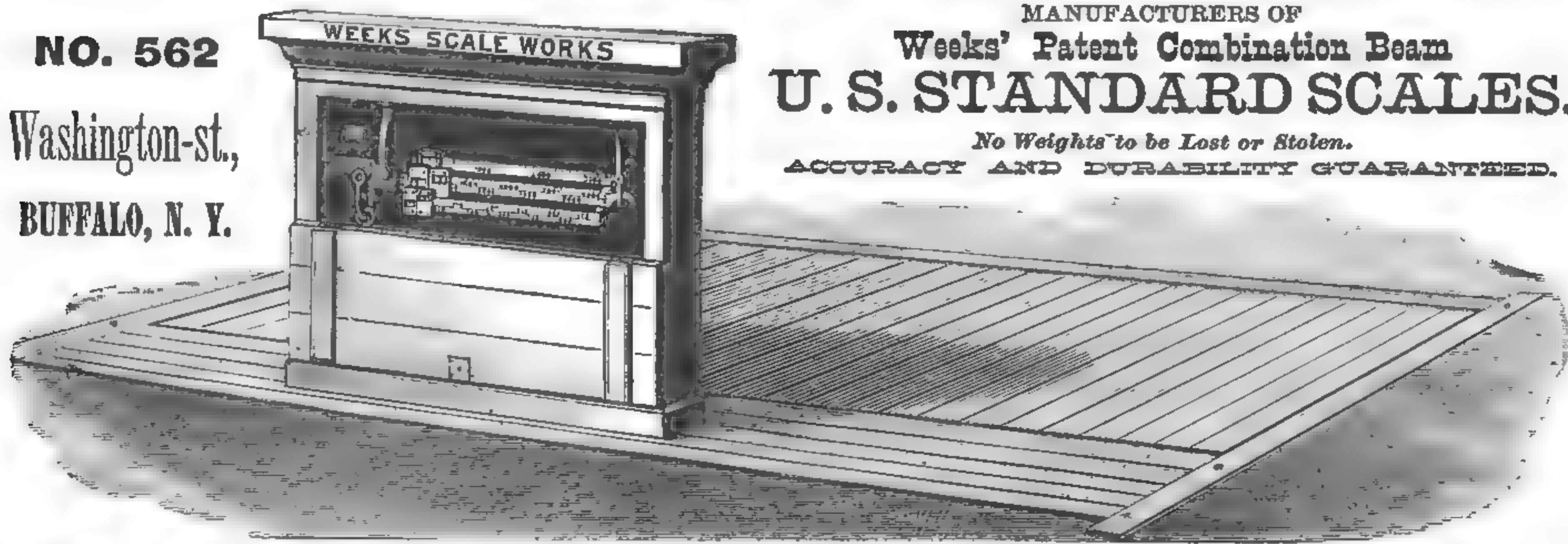
PATNA BRAND LACING. The Cost is not Greatly above the Standard.**G****UTTA & PERCHA & AND & RUBBER****R****MANUFACTURING CO.****161 LAKE-ST.****CHICAGO.**

MANUFACTURERS OF

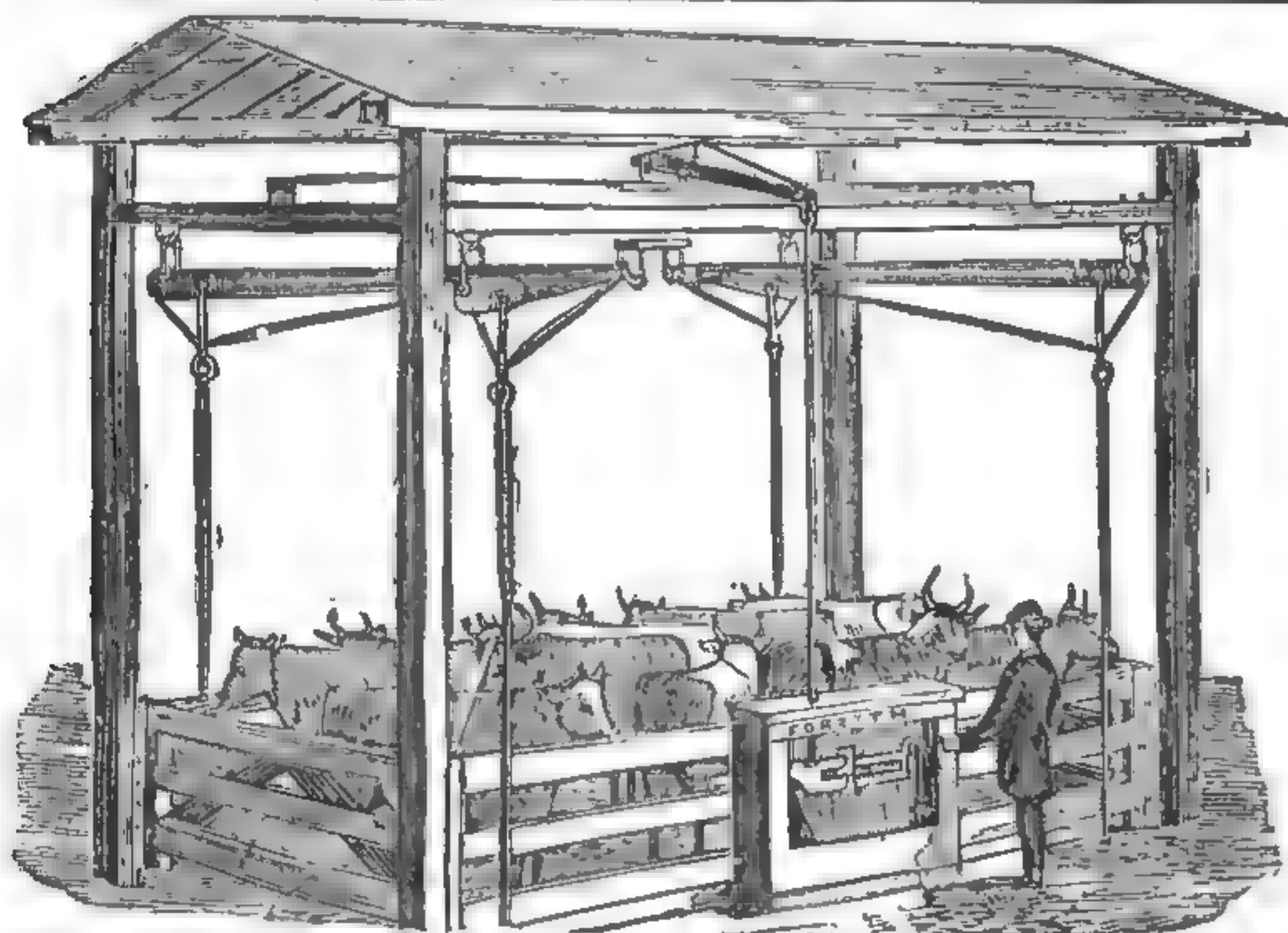
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Weeks' Patent Combination Beam
U. S. STANDARD SCALES.*No Weights to be Lost or Stolen.*
ACCURACY AND DURABILITY GUARANTEED.

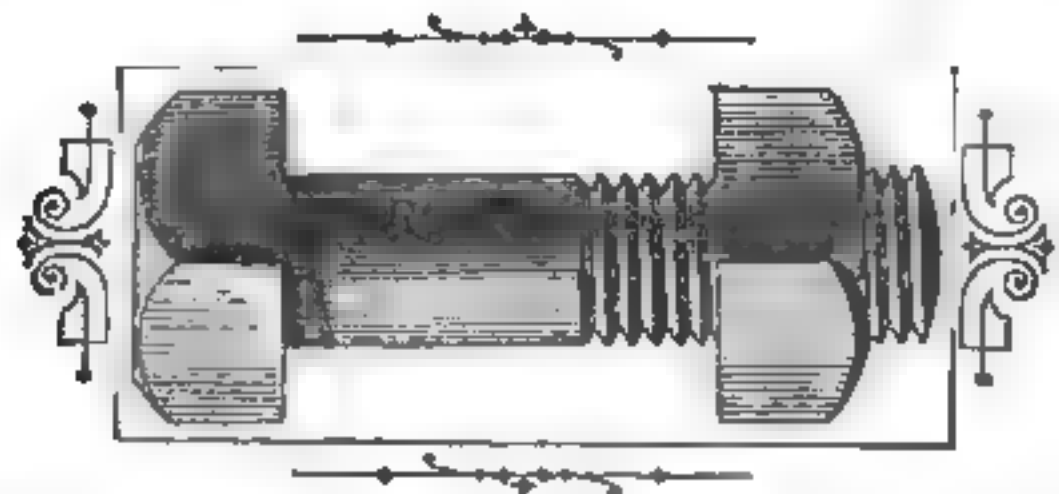
Price of 3-ton, platform 7 by 14 ft. - \$55.00
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 Other Sizes Proportionately Low in Prices.

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*Manufacturers of Railroad Track, Wagon,
Dormant, Portable and Counter***SCALES****BAG, BARREL AND STORE TRUCKS.***Call attention to their Suspension Scales, the Most
Durable and Accurate Scales made.***DIRECT IMPORTATION****BOLTING CLOTH:** Entering as it does so largely into successful flour making, has engaged our attention for nearly FIFTY YEARS.**OUR EXPERIENCE** Therefore, enables us to determine what makes are able to meet the requirements of the Miller.**WE HANDLE** None but the genuine NOYE and DUFOR brands and FULLY GUARANTEE both. Prices greatly REDUCED on both.**Correspondence Solicited.***Cloths made up in a superior manner on the shortest possible notice by patented machinery, giving a strength and durability not attainable by any other method. Only the best of materials used for this purpose.***The Jno. T. Noye M'f'g Co., Buffalo, N. Y.***Beware of second-hand Stevens Roller Mills offered by one of our competitors. They were made in 1881, and have since passed through a fire.*

FOR THE VERY BEST QUALITY, "CALIFORNIA"
—OF—
BOLTS,
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California Magnetic Brush Smutter
—AND—
SEPARATOR COMBINED.

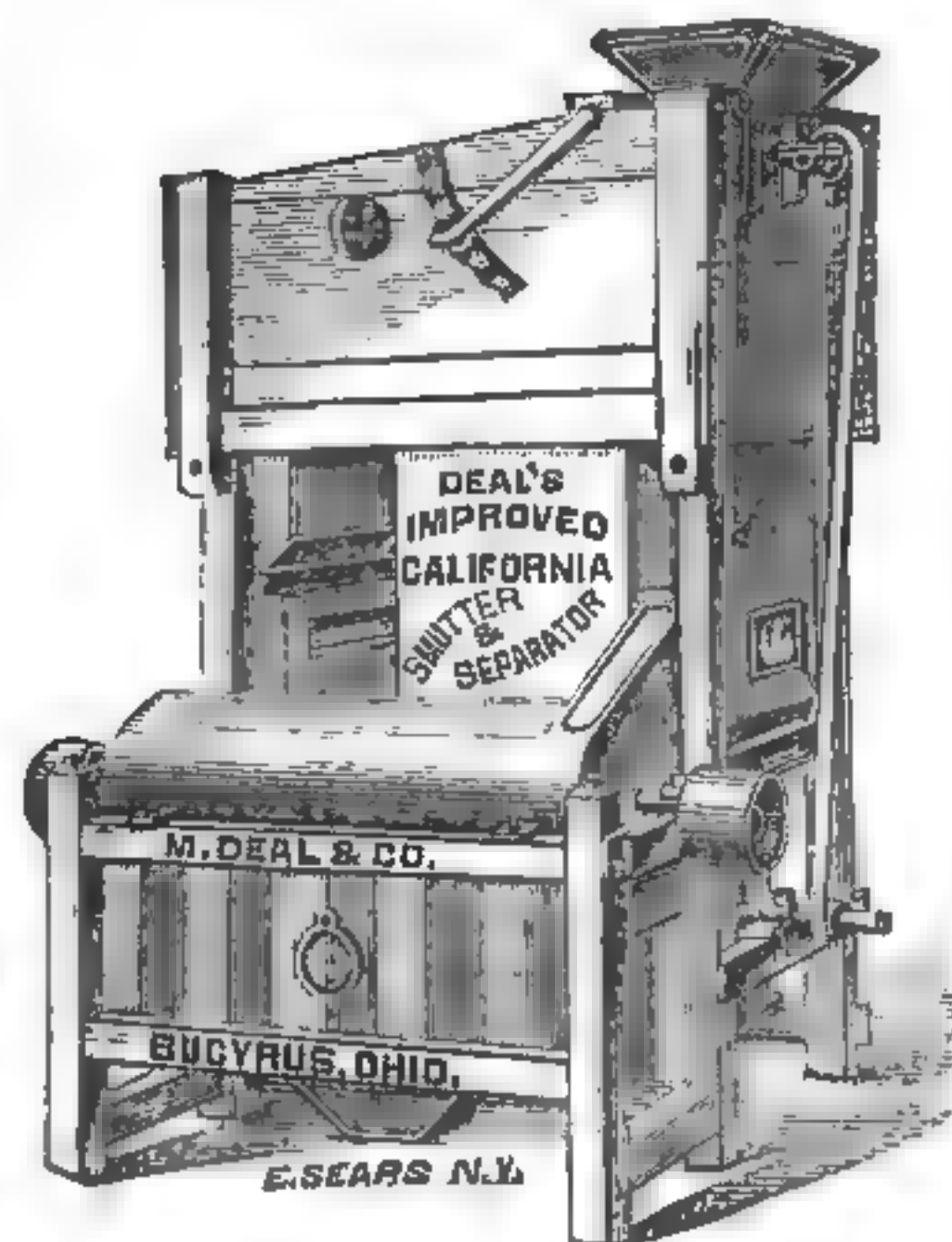


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WASHERS, ETC.,
IN EVERY VARIETY,**

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Warranted the Very Best in America
*The Purchaser being the Judge after
60 or 90 Days' Trial.*



We manufacture a complete line of Grain Cleaning Machinery and guarantee every machine to give entire satisfaction or no pay. Send for circular, it will pay you.

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COCKLE SEPARATOR M'F'G CO.,
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IMPROVED
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IS THE

Best constructed and finished;
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money, per horse power, than
any other Turbine in the world.

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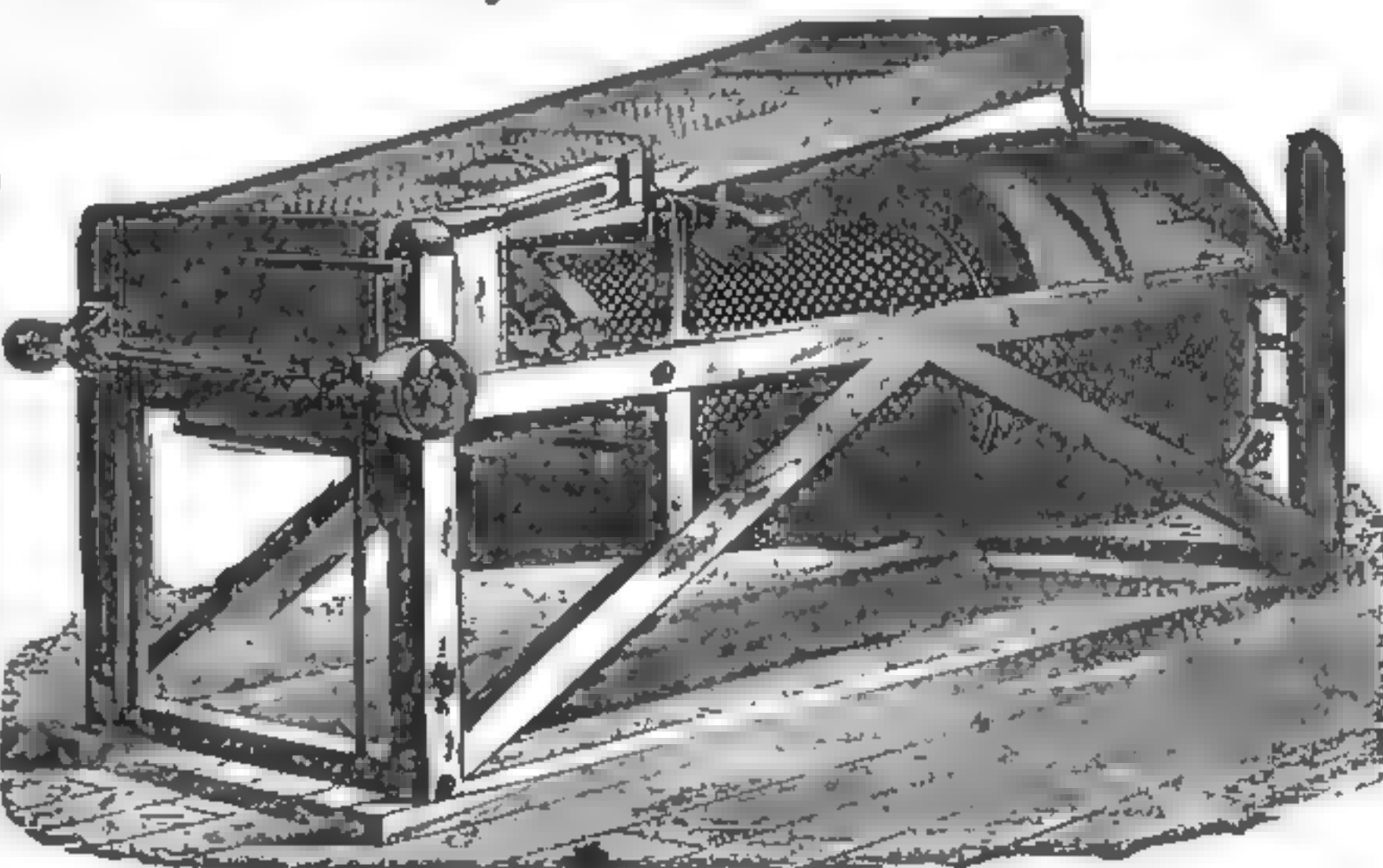
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General Mill Furnishers,
Manufacturers of
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The only machine that will make a
perfect separation without waste. In
use in every prominent mill in the
United States, Canada and Europe.—
Built with Richardson's Wheat Sepa-
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Beardslee's Patent Grain Cleaners,
Fully Guaranteed to give the Best of
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Pott's Patent Automatic Feeder for
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and cheap. Perforated Sheet Metals at
low prices. Send for Circulars and
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COMBINATION & HESTON'S PISTON PACKING.

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Incorporated April 1, 1882.
Manufacturers of the

KING COCKLE MILL AND SEED SEPARATOR.

As a Wheat Grader is unsurpassed by any device yet manufactured.

It has large capacity, does thorough work, and requires NO POWER,
and for cash with order will, during the year ending June 1, 1884, be sold
at a trifle above cost in order to get them introduced.

WHAT THEY SAY OF IT.

OFFICE NORTHWESTERN MILL,
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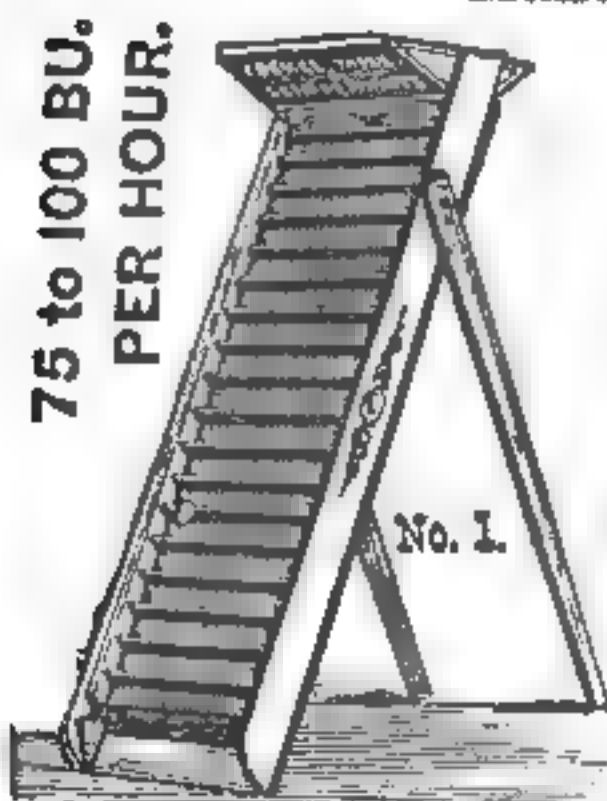
Messrs. La Du-King Mfg. Co.:

GENTLEMEN—We are using two of your Separators, and they work to our entire satisfaction. They
are the cheapest and best machine in the market. Please send us two more machines.

Yours truly

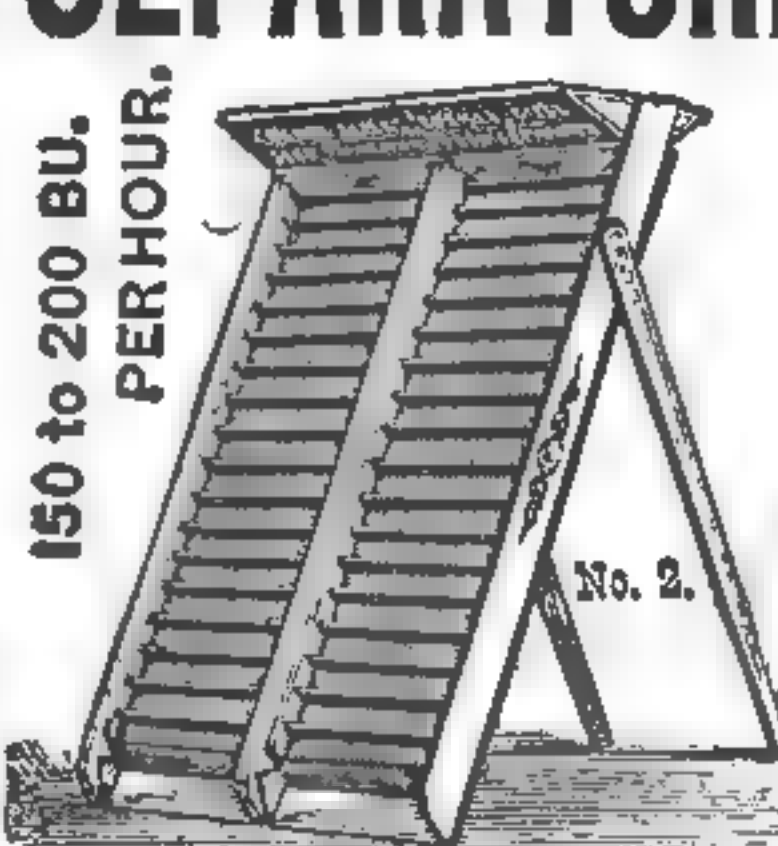
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75 to 100 BU.
PER HOUR.

No. 1.



150 to 200 BU.
PER HOUR.

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MANUFACTURERS OF
RAWHIDE BELTING,
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THE
CHICAGO RAWHIDE MFG. CO.
77 & 79 EAST OHIO STREET,
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Lariats and Other Rawhide Goods
OF ALL KINDS,
BY KRUEGER'S PATENT.



STAR & RUBBER & COMPANY

Belting, Packing, Hose, Etc.

BEST QUALITY AT LOWEST PRICES.

WRITE FOR DISCOUNTS.

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The Only Scales with Protected Bearings.

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If you want THE BEST SCALE MADE, buy the
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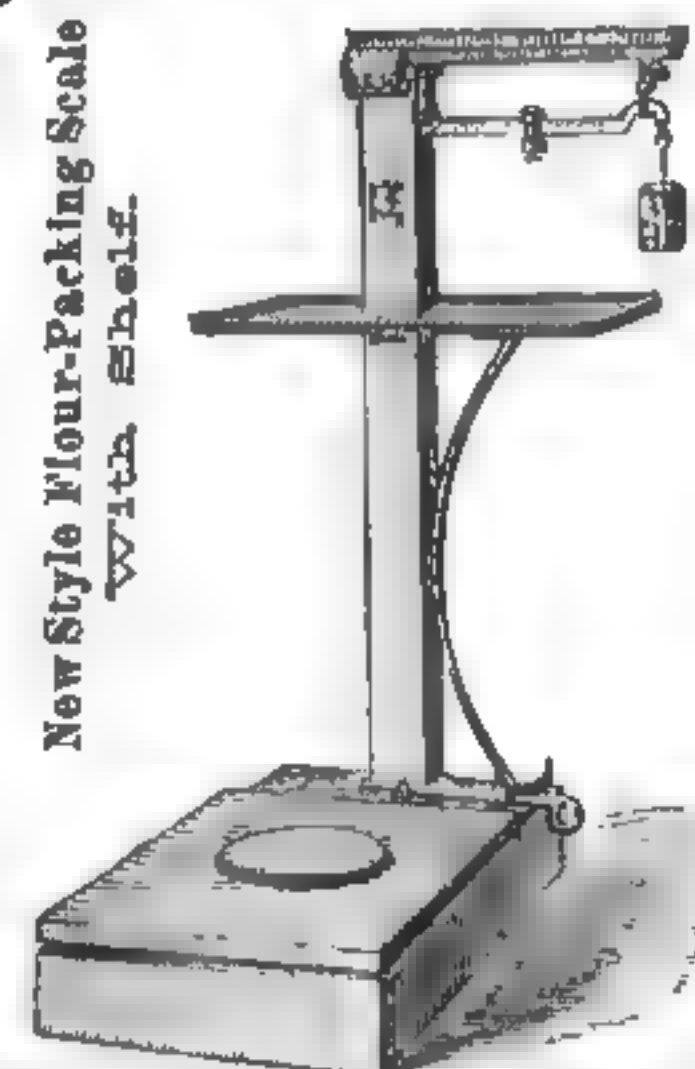
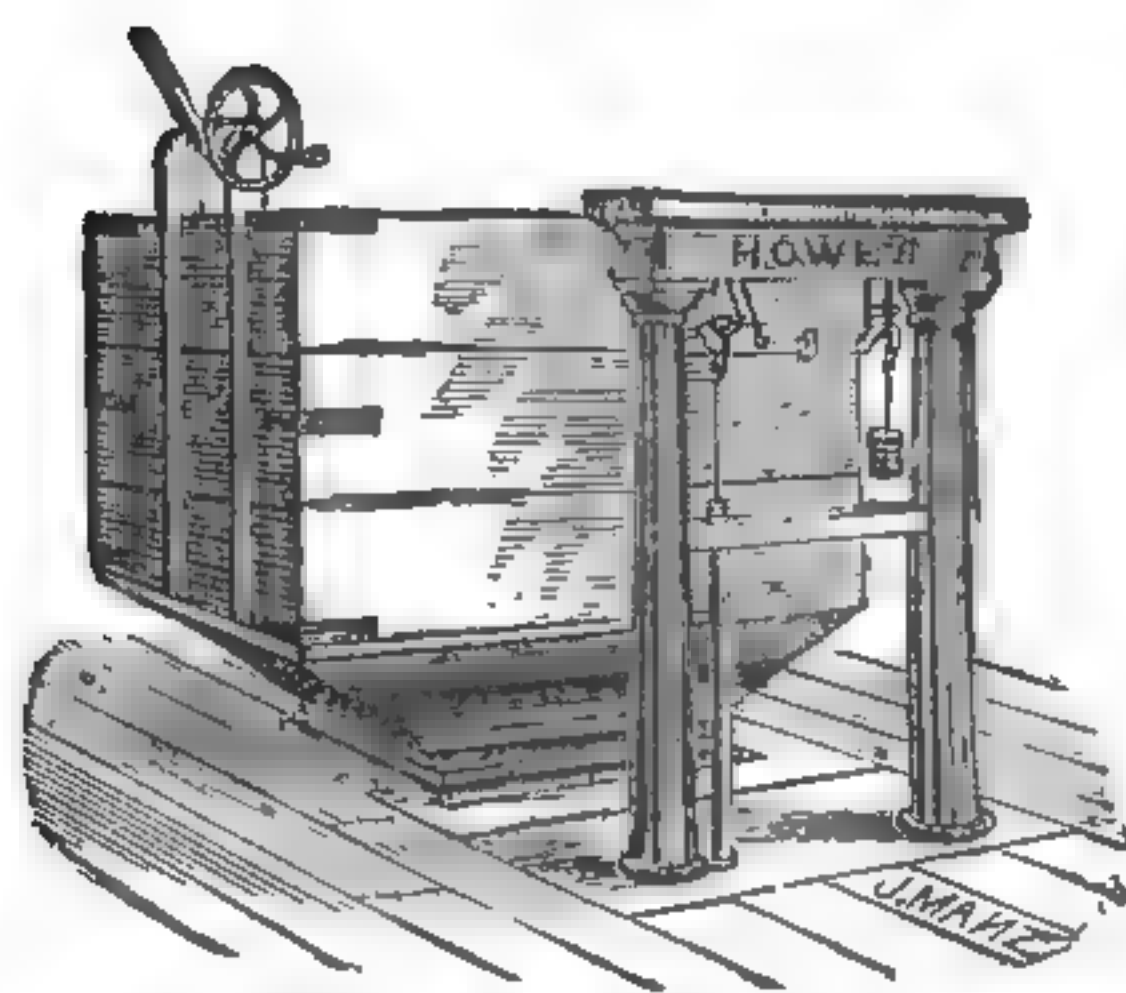
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Managers Western Warehouses,

CHICAGO: 97, 99 and 101 Lake-st. ST. LOUIS: 612 N. Third-st.

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New Style Flour-Packing Scale
with Shelf.

RUBBER BELTING.

Important to all Who Use Belting.

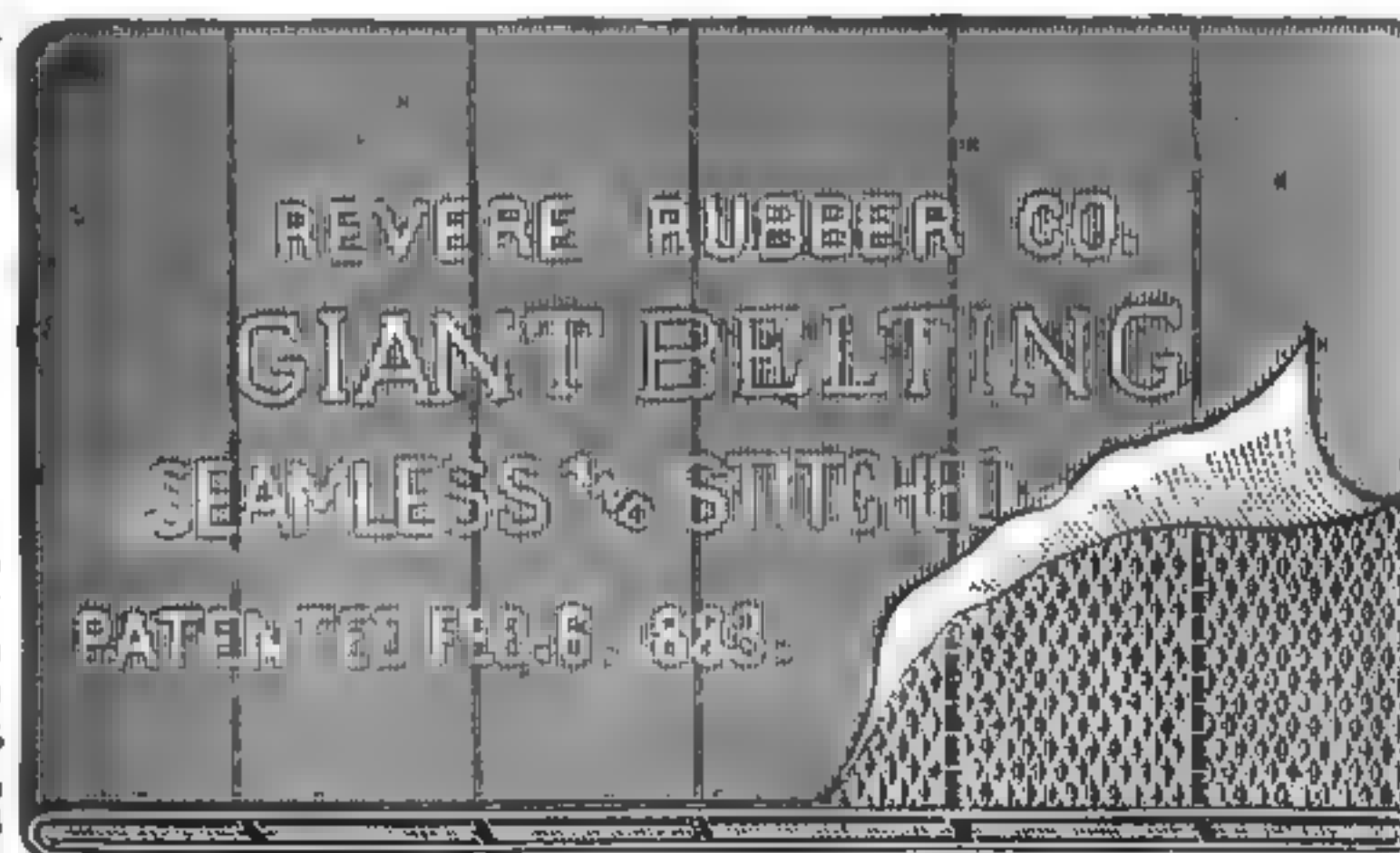
We have just patented a new article in Rubber Belting which is sold under the name of

GIANT BELTING!

This Belting is made up with the usual plies of Duck and Rubber, and, before putting on the outside cover, it is STITCHED in seams one inch apart with cotton cord, which has a pulling strength of fifty pounds. It is then STRETCHED in its elastic state, drawing the plies so close together that with the strong cord with which it is stitched, material strength is added to the belt, and the stitches are so drawn into the plastic rubber that they cannot wear off on the outside. The outside cover is then put on SEAMLESS, so that it cannot open, as is the case with Rubber Belting made in the ordinary way, and the plies being so firmly stitched, as well as frictioned together, that the belt cannot separate, as many belts made in the old way will after being used for a time, especially when run at great speed or in damp places.

We particularly call the attention of all mill owners to this belt as being in the end the cheapest belt they can buy, while the first cost is only about ten per cent. more than belting made in the old way. We believe that it will wear more than double the length of time. For heavy main belts you will find it superior to anything made. It is also superior for endless belts, as we stitch the splices in such a way that it cannot separate. TRY OUR GIANT BELT. WE WILL WARRANT SATISFACTION. Samples and quotations furnished on application.

REVERE RUBBER CO., 173 and 175 Devonshire Street, Boston; 57 Reade Street,
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NORDYKE & MARMON CO.,

INDIANAPOLIS, IND.,

Builders from the Raw Material of

ROLLER MILLS! CENTRIFUGAL REELS,

Flour Bolts, Scalping Reels, Aspirators.

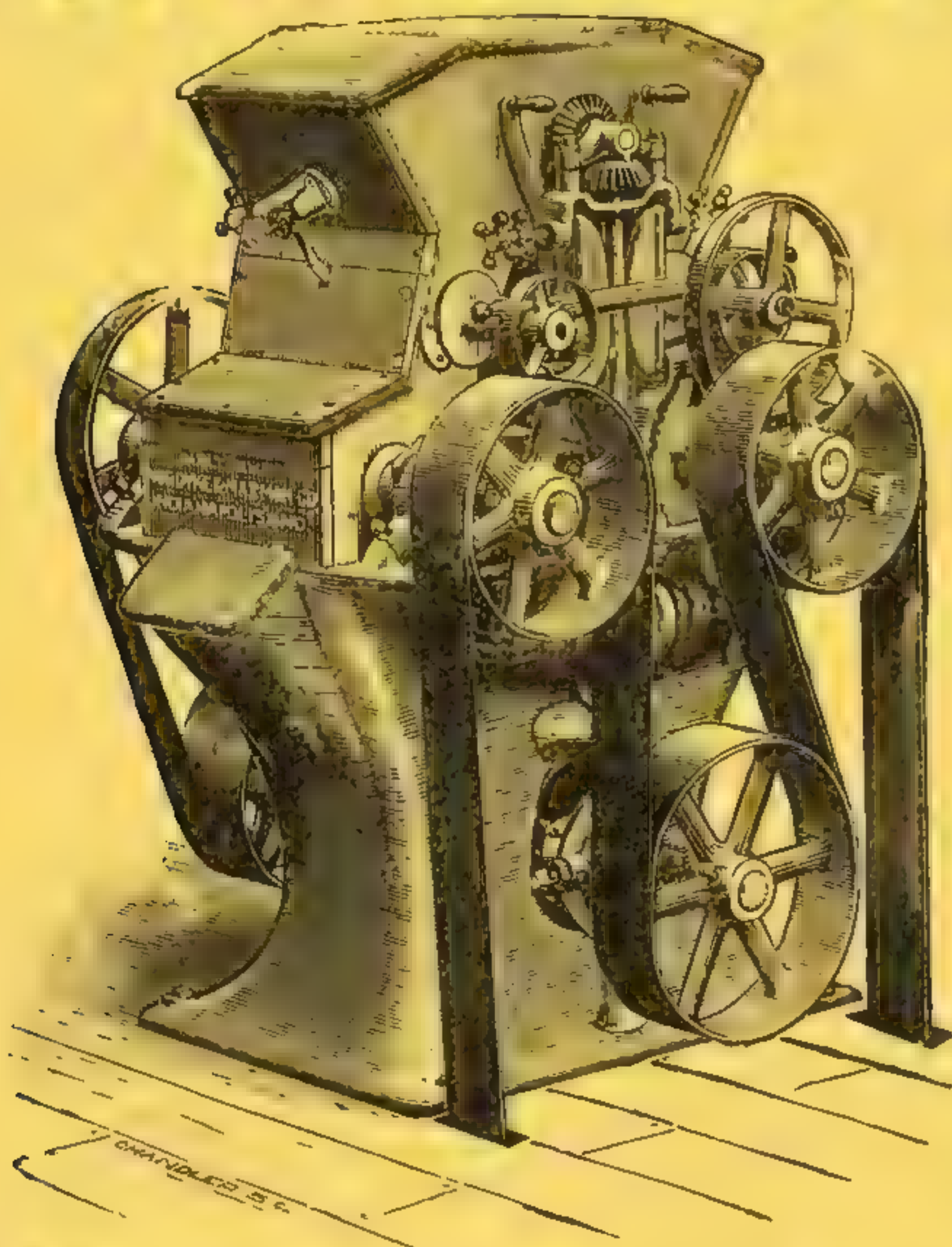
Millstones, Portable Mills,

—AND KEEP THE LARGEST STOCK OF—

All Kinds of Mill Supplies

IN THE UNITED STATES.

Special Milling Department!



Mill Builders and Contractors.---Guarantee Results

Motive Power and Entire Equipment of a Modern Mill Furnished under one Contract.

500 BARREL MILL IN MISSOURI.

Read what an Old Miller who has Thirty-four Pairs of these Rolls in Constant Use, Says:

Messrs. Nordyke & Marmen Co., Indianapolis, Ind.,

GENTLEMEN:—In regard to the workings of our new mill erected by you, will say it is working fully up to and beyond our expectations. Our average work is fully 33 per cent. over your guarantee. Since starting our mill last July we have had no complaint of our flour from any market where sold. It gives universal satisfaction, and we have it scattered on the trade from Chicago to Galveston, Texas. Our yields are all that are attainable. We have tested it on both Spring and Winter wheats with satisfactory results on both varieties. Since the mill was turned over to us we have not changed a spout or a foot of cloth, nor have we found it required to make any changes. We have run as long as six days and nights without shutting steam off the engine, not having a "choke" or a belt to come off. The mill is entirely satisfactory to us, and for a fine job of workmanship, milling skill and perfection of system, we doubt if it is surpassed in the United States to-day. It is certainly a grand monument to the ability and skill of Col. C. A. Winn, your Milling Engineer and Designer. You may point to this mill with pride and say to competitors, "You may try to equal, but you will never beat it." Wishing you the success that honorable dealing deserves, I am
Yours, &c.,
R. H. FAUCETT, Pres.

OFFICE OF DAVIS & FAUCETT MILLING CO., }
ST. JOSEPH, MO., Nov. 28th, 1883. }

500 BARREL MILL IN ILLINOIS.

Messrs. Nordyke & Marmen Co., Indianapolis, Ind.,

GENTLEMEN:—We have now been running our mill since June last, and it gives us pleasure to write you that your rolls are doing splendid work and give us no trouble. Your milling programme required no changes, and concerning yields, we get all the flour from the offals, and we sell our best grades in most all of the principal markets of Europe and the United States at the very highest prices offered for any flour; being thirty miles from St. Louis we have their highest grades to compete with. All the machinery made by you is first-class, amply heavy, and requires much less attention than we supposed it was possible to design and equip a mill, and we would not know where to purchase as good mill work. Yours very respectfully,
P. S.—Our correspondent at Antwerp, Belgium, says in a late communication: "Your flour, Messrs. Suppiger, is considered by all who have sampled it as the very best winter wheat flour that ever reached Belgium," etc. In fact, wherever we have shipped to, not a single complaint has reached us so far, and we have always realized the very best price for our flour.
D. S. & CO.

HIGHLAND MILLS, }
HIGHLAND, ILL., January 16, 1884. }

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Letters on file in our office from a large number of small roller millers giving as favorable reports as above. A portion will be published as occasion demands.

NORDYKE & MARMON CO., Indianapolis Ind.

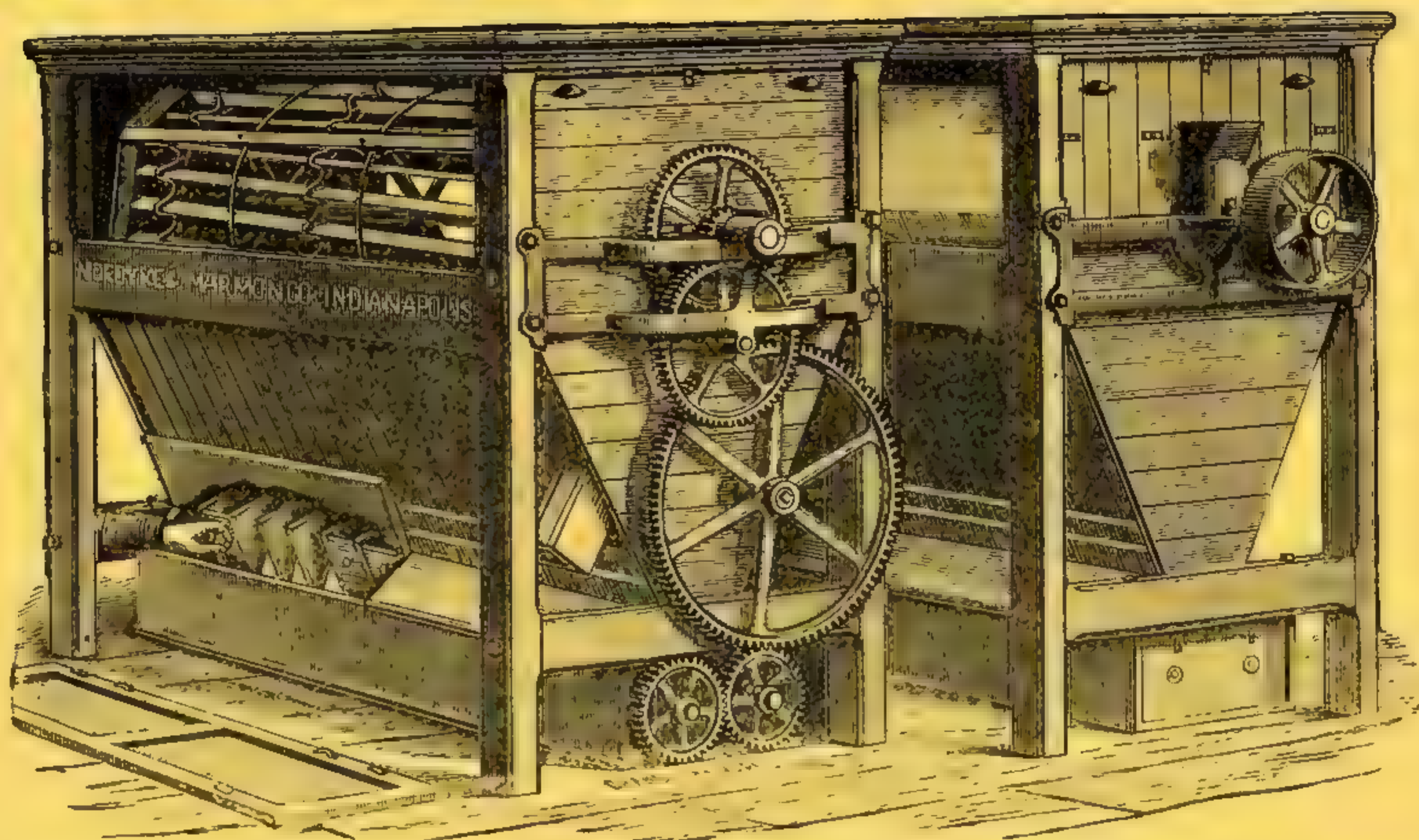
The Nordyke & Marmion Centrifugal

TRY NO EXPERIMENT...GET THE LATEST AND BEST.

A MODEL OF SIMPLICITY

Acknowledged Perfection

IN SEPARATION.



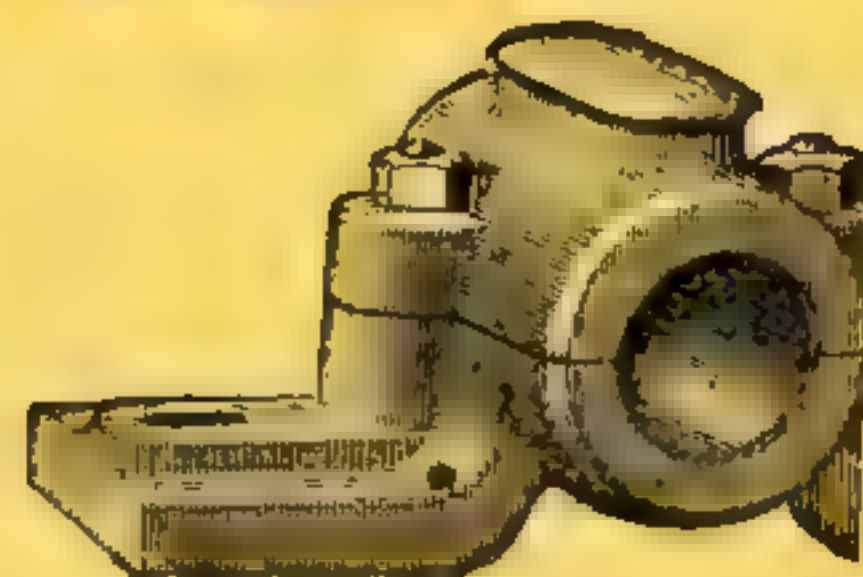
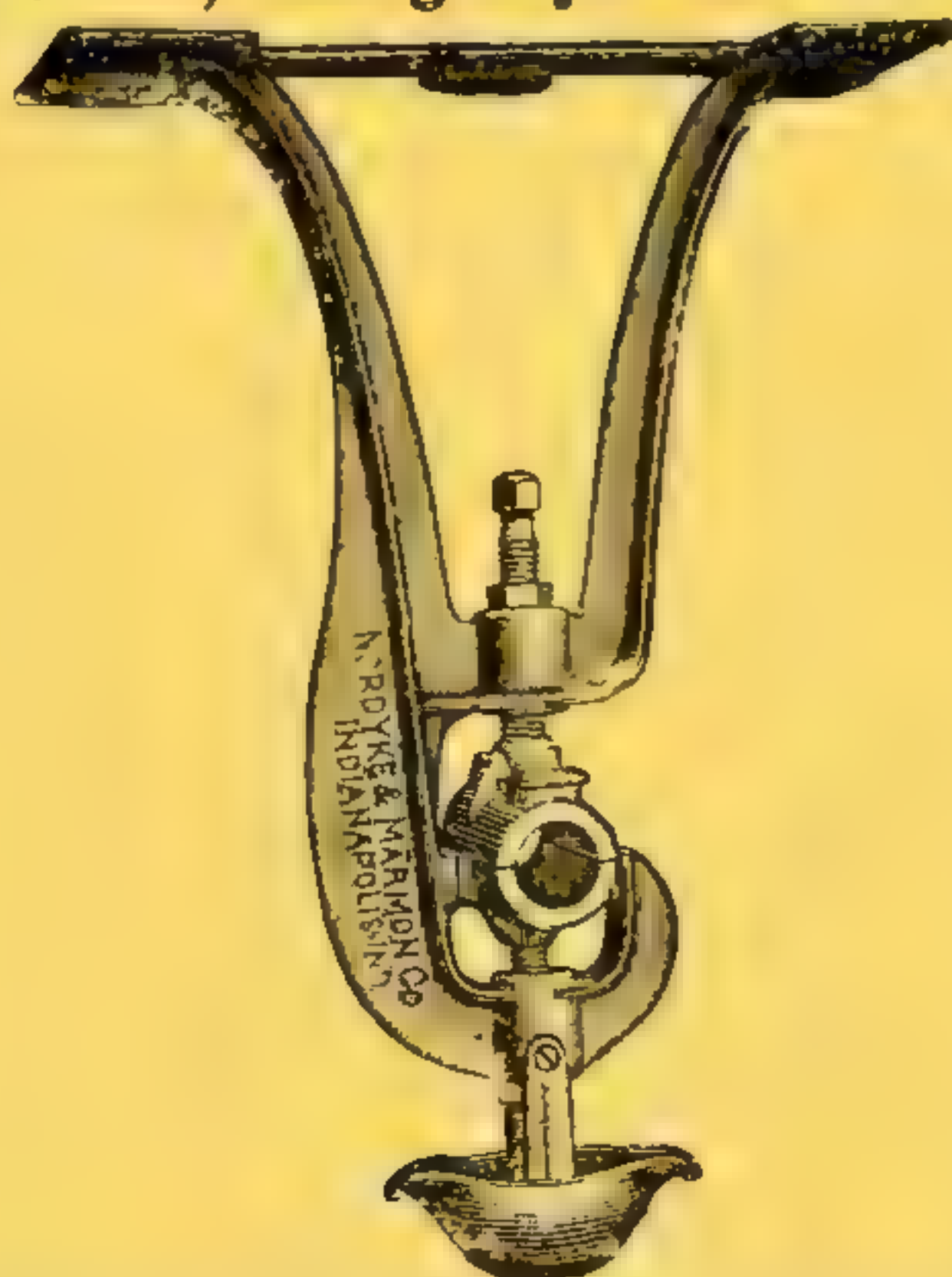
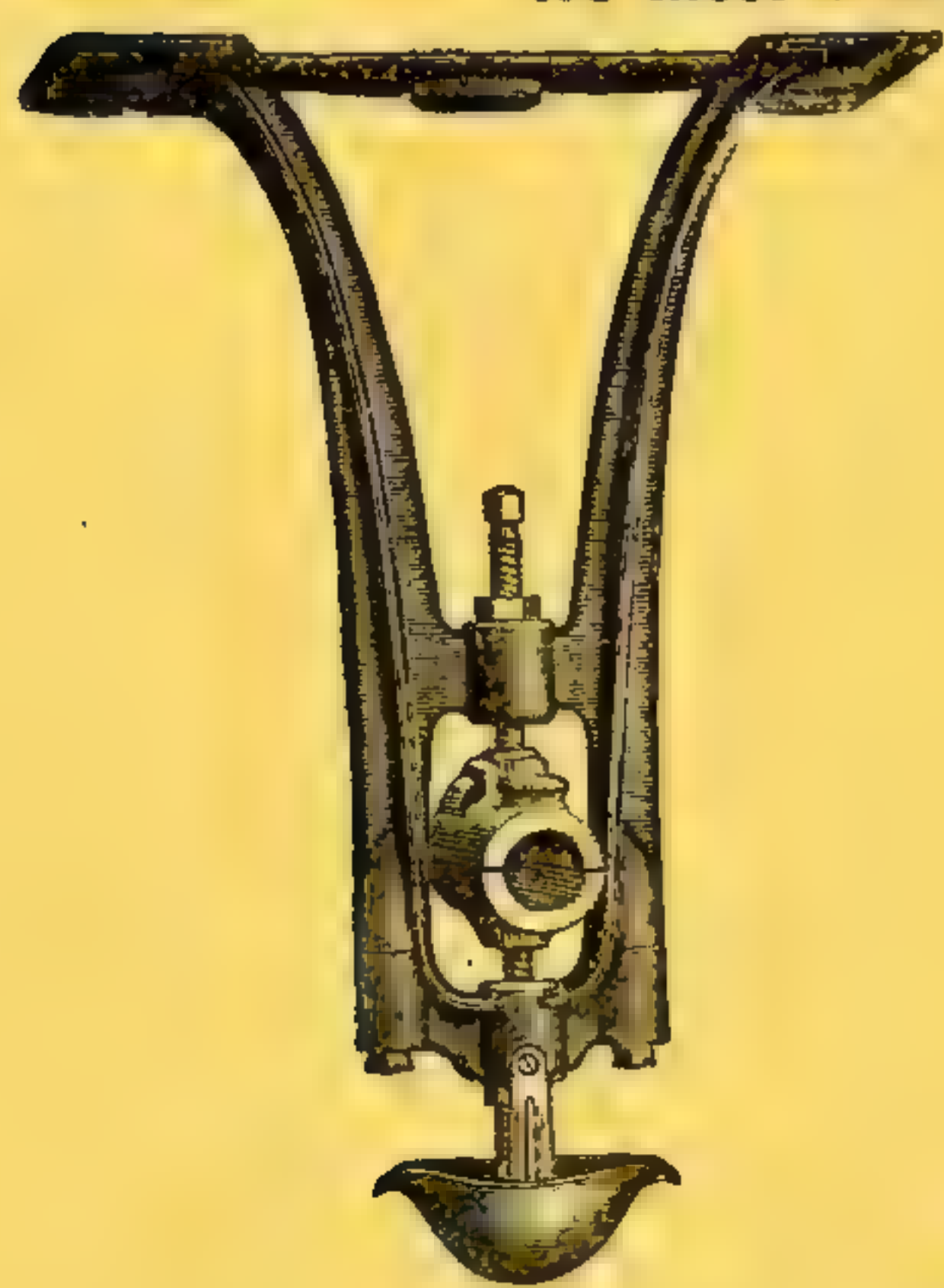
GUARANTEED.

"No Cheap Traps or Chains, but all Heavy, Strong and Durable," are words of a prominent miller.

Save Money by Getting Prices and Description Before You Purchase

OUR SHAFTING, PULLEY AND GEAR DEPARTMENT

We Meet Competition in Prices, and give you the Best Goods on the Market.



Send for New Price and Weight List of over 3,000 Pulleys and Gears of our own Patterns.

NORDYKE & MARMION CO., Indianapolis, In.



OBENCHAIN'S AUTOMATIC GRINDING AND REDUCTION MILL

Is self-regulating, and will continue to grind just as it is set, and the expansion and contraction of the spindle has no effect upon its grinding.

It is always in perfect tram when grinding, as it is absolutely a self-trammer.

An obstruction entering this mill, the stones will part just enough to allow it to pass through, and immediately adjust themselves and grind the same as before obstruction entered.

IT WILL GRIND MIDDINGS

As slow as ten pounds per hour, or as fast as six hundred, according to speed and pressure given, and cannot be excelled for grinding wheat or corn.

We make four sizes of these mills, 14, 20, 25 and 30 inches, all of the best quality of Old Stock French Buhr, set in solid iron frames.

Cut No. 1 represents this mill as made to set upon mill floor. Cut No. 2 is our Hanger Mill, and it is intended that hanger and pulley pass down through the husk floor to be driven from any mill spindle or upright shaft. With these mills we make a specialty of constructing New Process custom and merchant mills, and mills on the gradual reduction system, at a low figure.

Illustrated pamphlet, giving full description and prices, sent on application to

Mention this paper.

KNOWLTON & DOLAN, Manufacturers, Logansport, Ind.

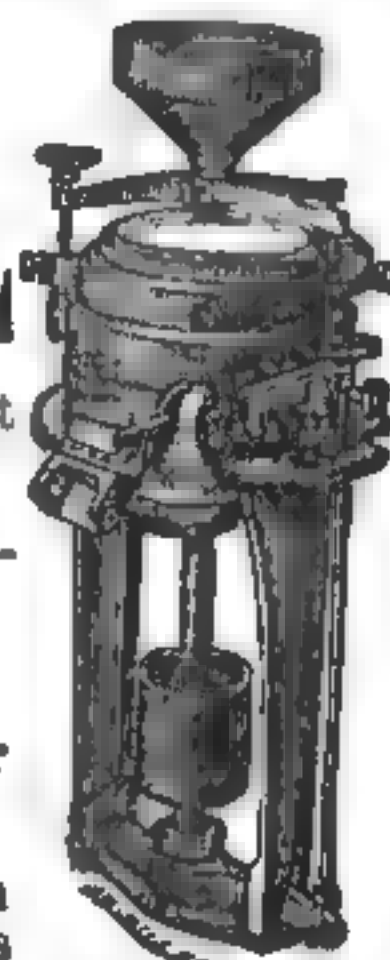


Fig. 2.

N. P. BOWSER,

South Bend, Ind.

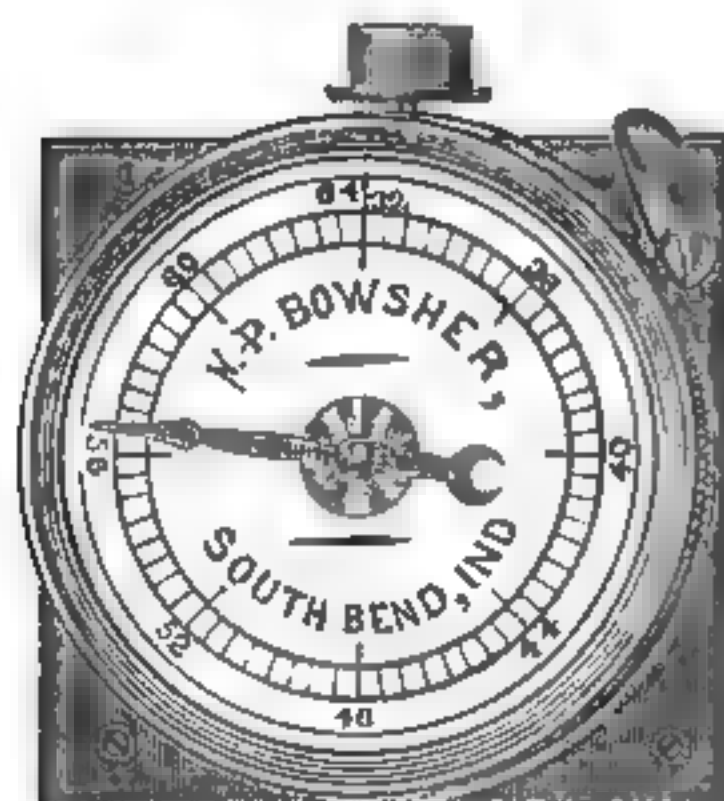
— Manufacturer of —

BOWSER'S

SPEED or MOTION

INDICATOR.

(With or Without Alarm.)

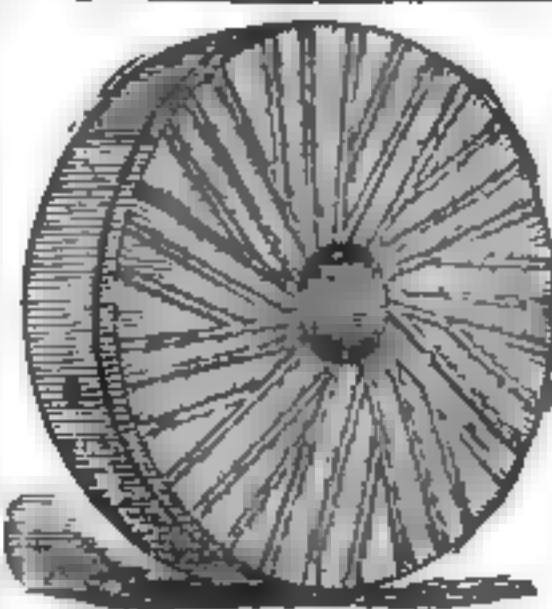


This Indicator has a well-established reputation, and if desired is sent to any responsible party on thirty days' trial.

Always give size and average speed of shaft to which you wish to connect. Address as above, or any leading mill-furnisher.

To 1884.

THE
SIMPSON & GAULT
 Manufacturing Co.
 HAVE MADE
 Flour Mill Machinery
 SINCE
CINCINNATI
 From 1844



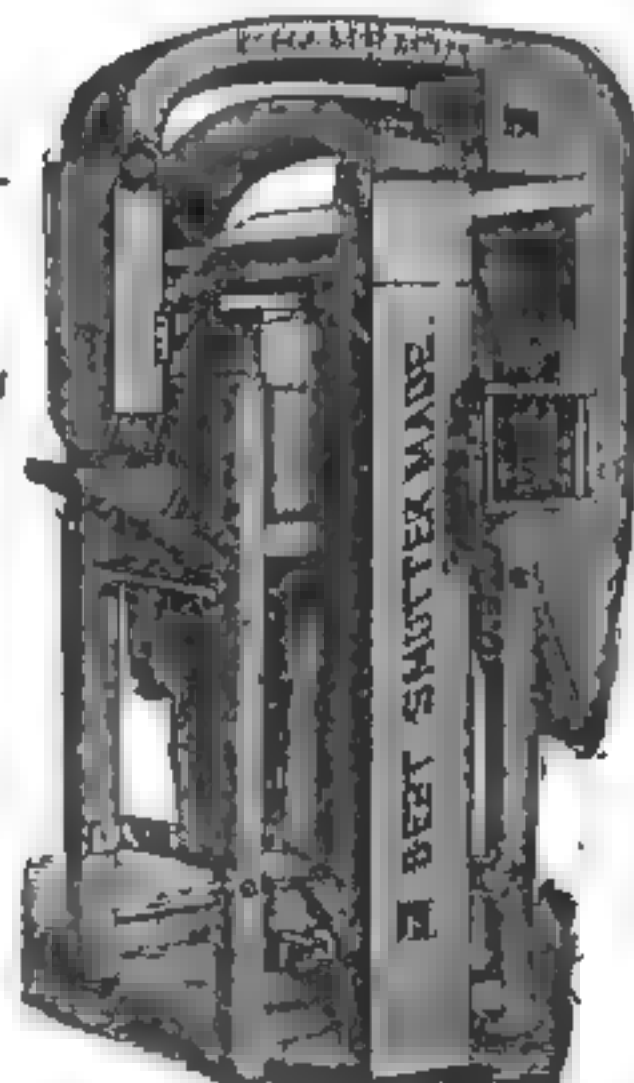
40 YEARS
 —OF—
SUCCESSFUL WORK.

WE MAKE FIGURES

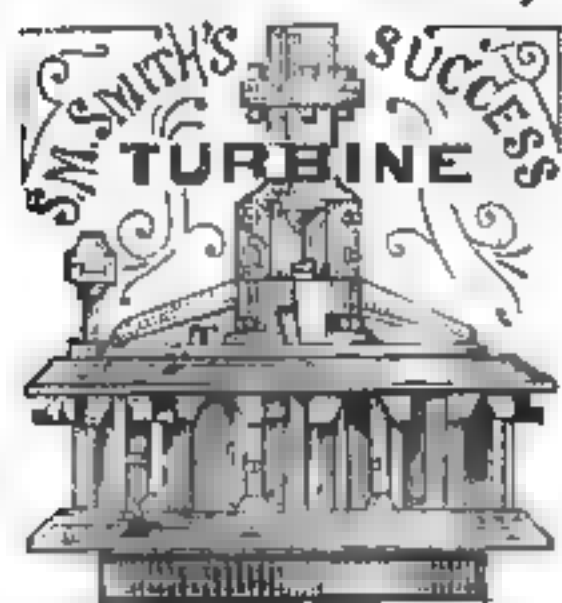
—ON ANYTHING—

Needed in a Flour Mill.

WRITE US.

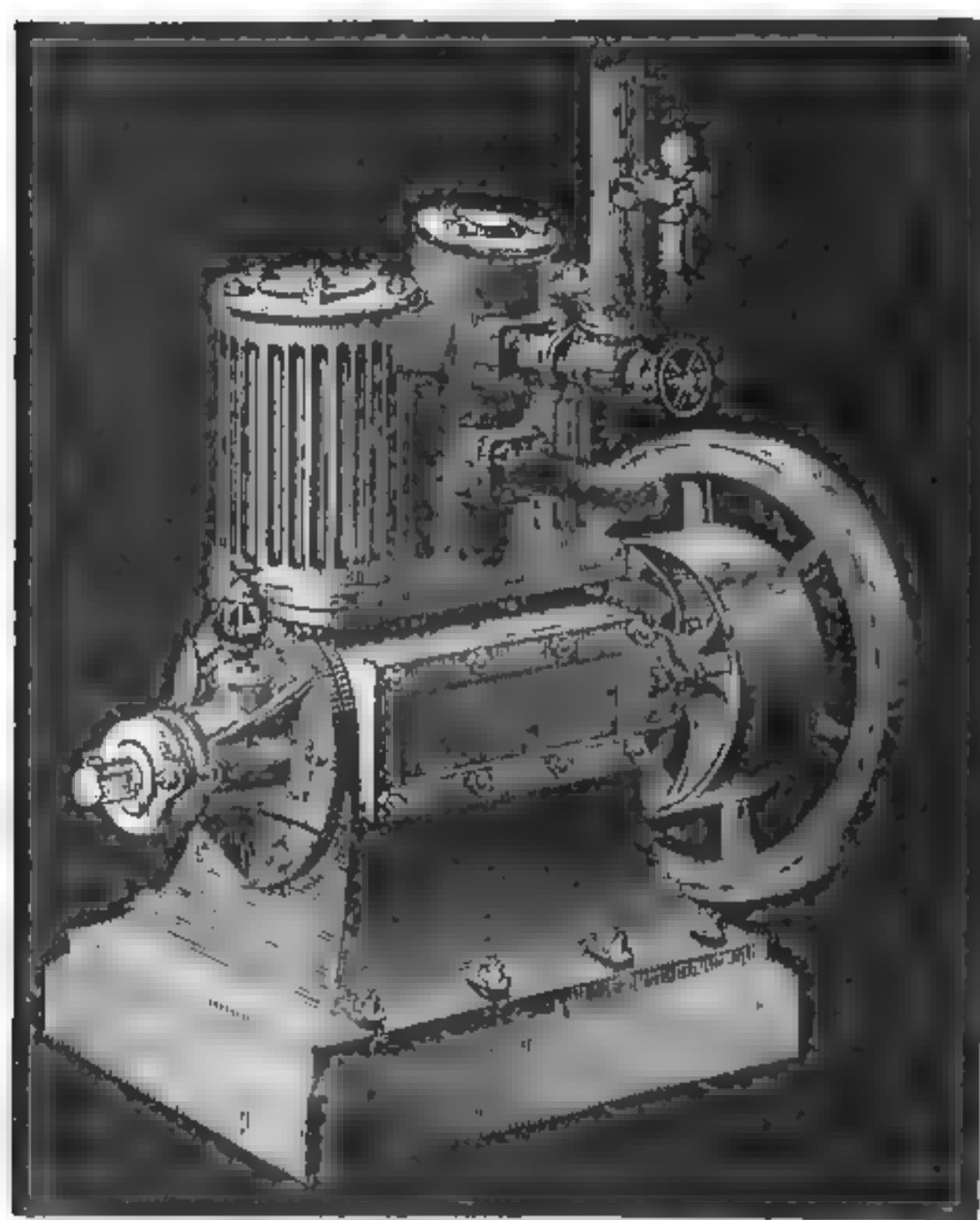


IMPROVED SUCCESS!



Percentage:
 Full Gate..... 86.29
 3/4 Gate..... 86.07
 1/2 Gate..... 81.90
 This Wheel is durable and cheap.
 Send for Pamphlet to
S. MORCAN SMITH,
 York, Pa.

THE WESTINGHOUSE AUTOMATIC ENGINE



[Rear View with one fly wheel removed.]

Over 600 Engines now in Use, Aggregating 16,000 Horse Power.

The Westinghouse Automatic Engine has no equal in SENSITIVE AND CLOSE REGULATION, LOW COST OF MAINTENANCE, AND GENERAL CONVENIENCE and in all other features of a First-class Engine it is guaranteed to have no superior.

Occupies least space and saves half the cost of foundations. All sizes built strictly to gauge, and parts interchangeable. Every engine tested to full power before leaving the shop.

Our engines are largely used in both buhr and roller mills both as the sole power, and as a relay to deficient water power.

Especially Adapted to Coupling Direct to Jack-Shaft, or to Special Machinery.

Send for Illustrated Circular and reference list, and state the horse power required.

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Address if more convenient our following Branch Offices:

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LEWIS METESSER,
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RICHMOND MANUFACTURING CO.,

LOCKPORT, N. Y.

Manufacturers of

RICHMOND'S CELEBRATED

Warehouse Receiving Separator, Grain Separator and Oat Extractor,

WHEAT SCOURERS, AND WHEAT BRUSH MACHINES,
Upright and Horizontal Bran Dusters,
CENTRIFUGAL FLOUR DRESSING MACHINES.

Thousands of these machines are in successful operation, both in this country and in Europe. Correspondence solicited. Send for Descriptive Catalogue.

THE "PERFECTION" WATER WHEEL

Needs no Penstock and Saves its Cost.

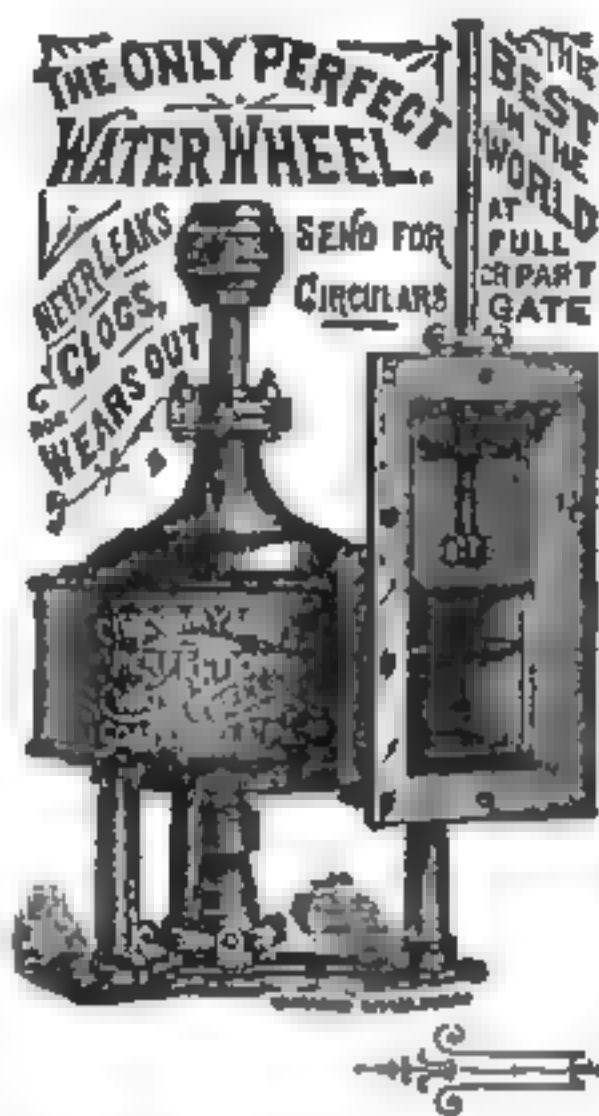
ITS VIRTUES AND WHAT WE GUARANTEE:

Highest Efficiency. Never Wears Out.
Tight Gate. Never out of Order.
No Clogging. Needs no Penstock.

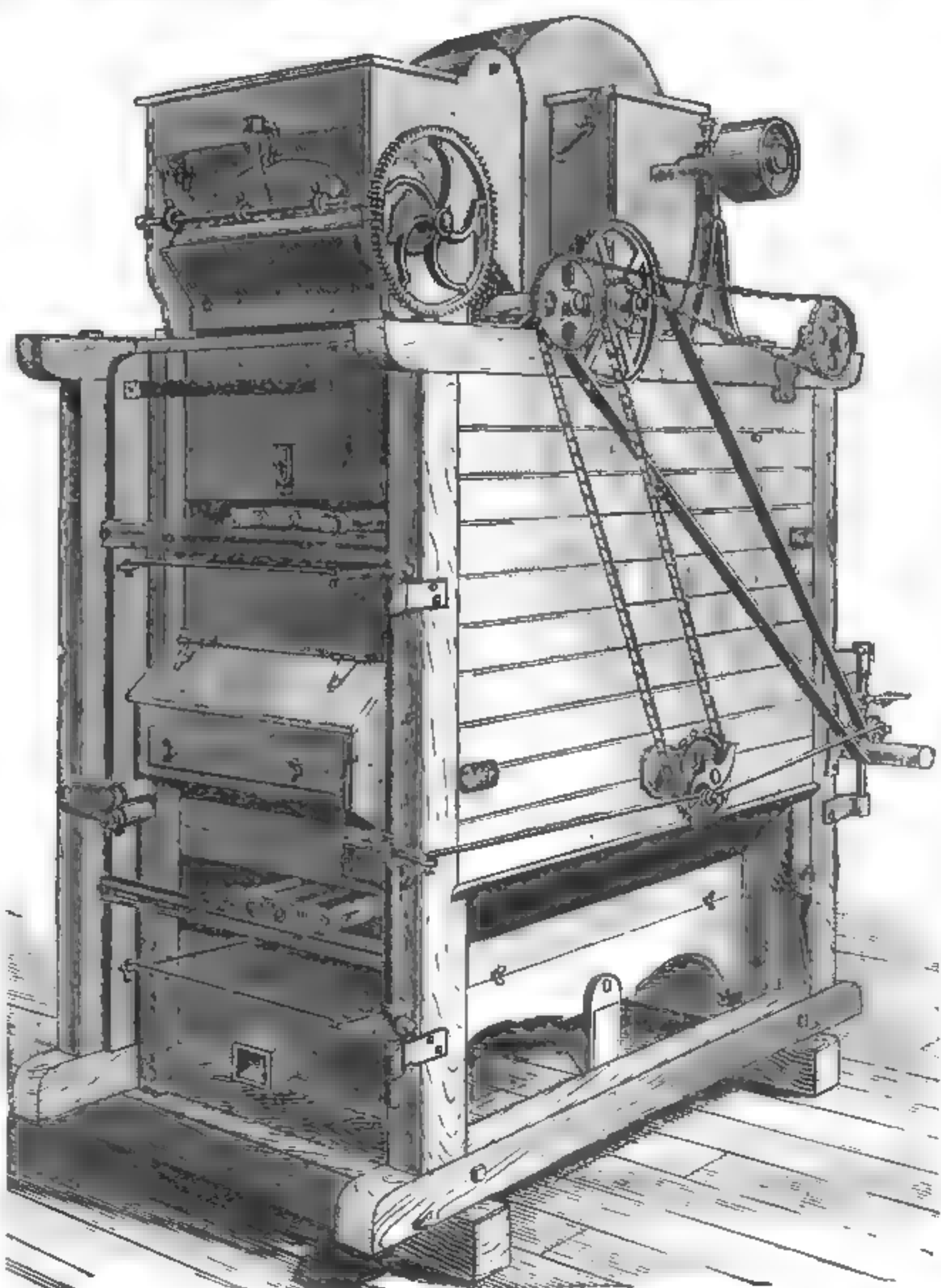
It will pay every mill-owner contemplating a new water wheel to send for our new illustrated wheel book.

Hundreds of wheels in use in the largest mills in the world. Send for circulars.

C. RIDGWAY & SON,
 Coatesville, Pa.



J. T. WALTER'S DOUBLE CURRENT MIDDINGS PURIFIER



Guaranteed Licensed UNDER ALL Conflicting Patents.

The Automatic Separation Feeder.—The process of taking out the heavy Specks between each number of cloth. The settling of the heavy dust, and lifting the light fuzz into the dust room.

THIS IS THE SMALLEST MACHINE IN THE WORLD, BY FAR.

Write for Circulars, Prices etc.
 Address

WITH COLLINS' AUTOMATIC CLOTH CLEANER.
 This Purifier has the following features which are secured to it by patent, and which no other Purifier can use.

Guaranteed to be the Best in the World.

J. T. WALTER, Easton, Pa.

C.**H. W. WALCOTT & CO.,**

—MANUFACTURERS AND DEALERS IN—

GRAIN-CLEANING MACHINERY, MILL AND ELEVATOR —SUPPLIES—

—AGENTS FOR—

DUFOR & CO.'S

—CELEBRATED—

ANCHOR BRAND

Bolting Cloth and Grit Gauze.

WIRE CLOTH ALWAYS IN STOCK.

INDIANAPOLIS, IND.

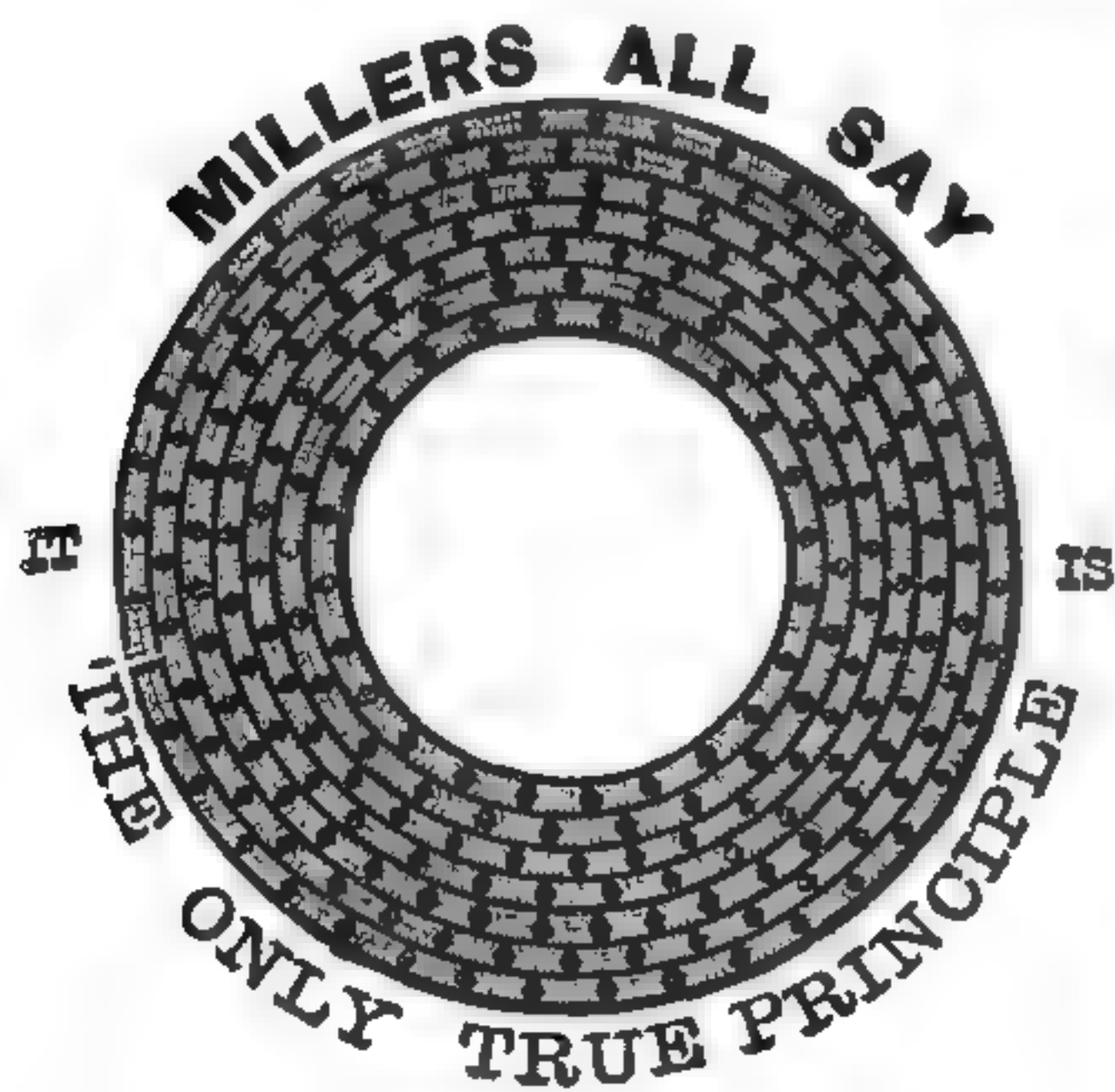
**BELTING,
BUCKETS,
Etc.**

**SMITH BROS. & CO., MILL FURNISHERS,**

Patented Sept. 8, 1882.

And Sole Manufacturers of the

Patented June 12, 1883.

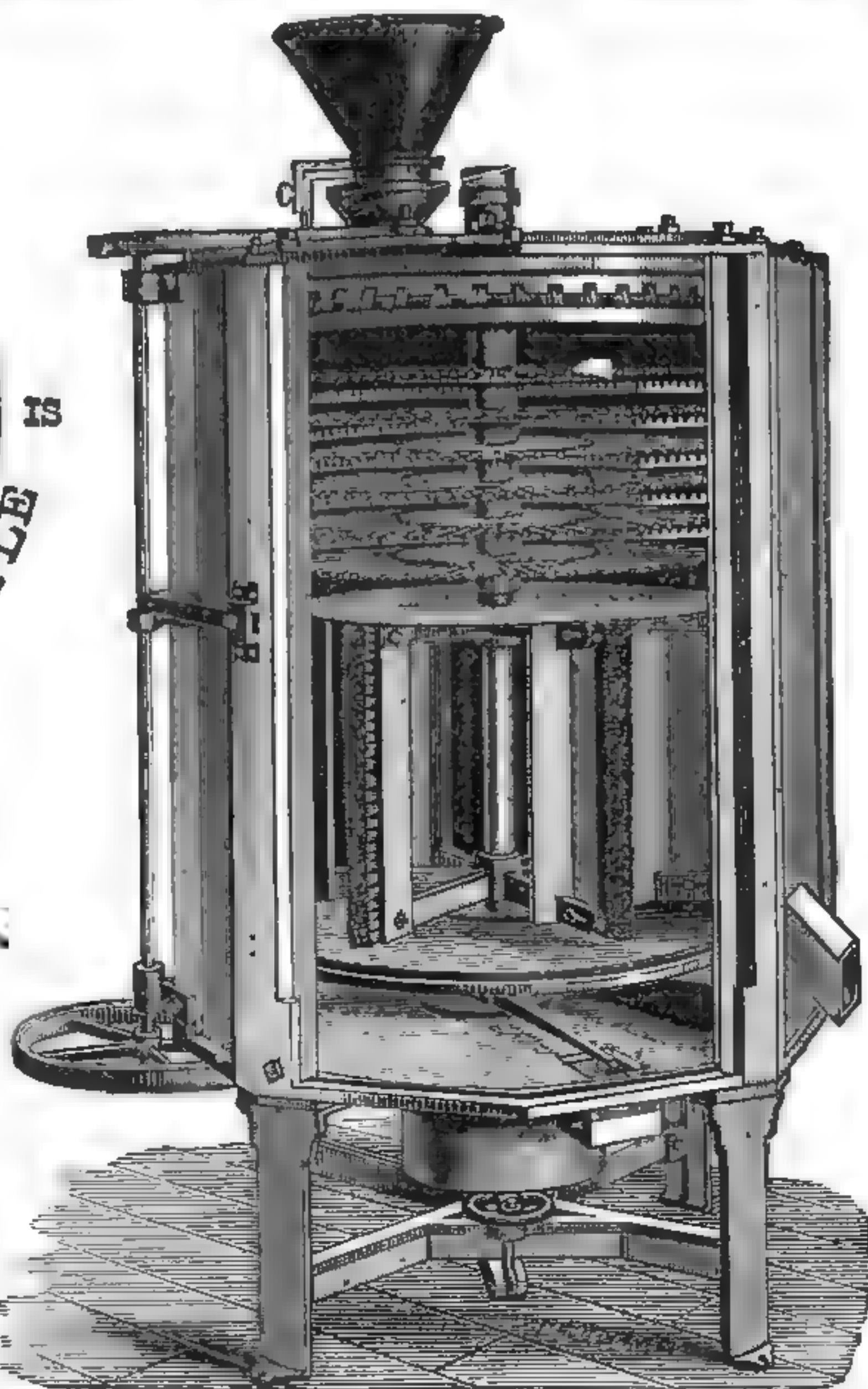
THREE RIVERS BRAN CLEANER & DUSTER**TO CLEAN BRAN**

—AND—

UNFINISHED MIDDINGS.

And remember it is a first-class Cleaner and Duster Combined for about the same price as one ordinary Bran Duster.

We challenge any machine in the market to do as good work, first, as to the quantity of stock which can be put in the best grades, and the amount saved by one operation. It has been equaled by no other device. These machines are set up to run from top when ordered. We send them on trial, and let the users be their own judges.



And that it is the only machine upon the market that will Thoroughly Dust bran coming from rolls where the flakes are pressed so hard by the rolls that they will not bolt thoroughly.

Please send for circulars and sample of work.

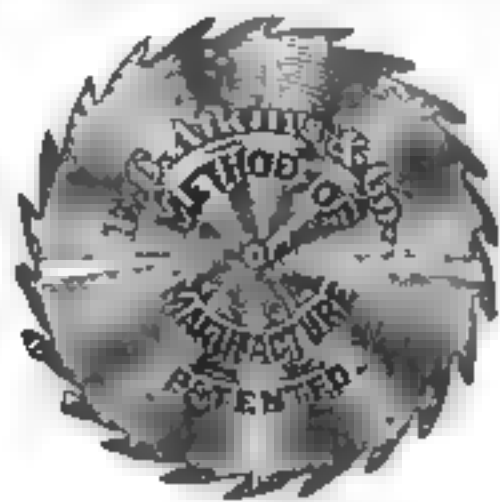
SMITH BROS. & CO.,

Office and Works:

**12, 14 & 16 Flint Avenue,
THREE RIVERS, MICH.**

E. C. ATKINS & CO.

Manufacturers of the Celebrated
SILVER STEEL AND BEST REFINED CAST STEEL



Circular, Gang and Cross-Cut Saws.

All real defects covered by our warrantee. Repairing
done in the most careful manner.

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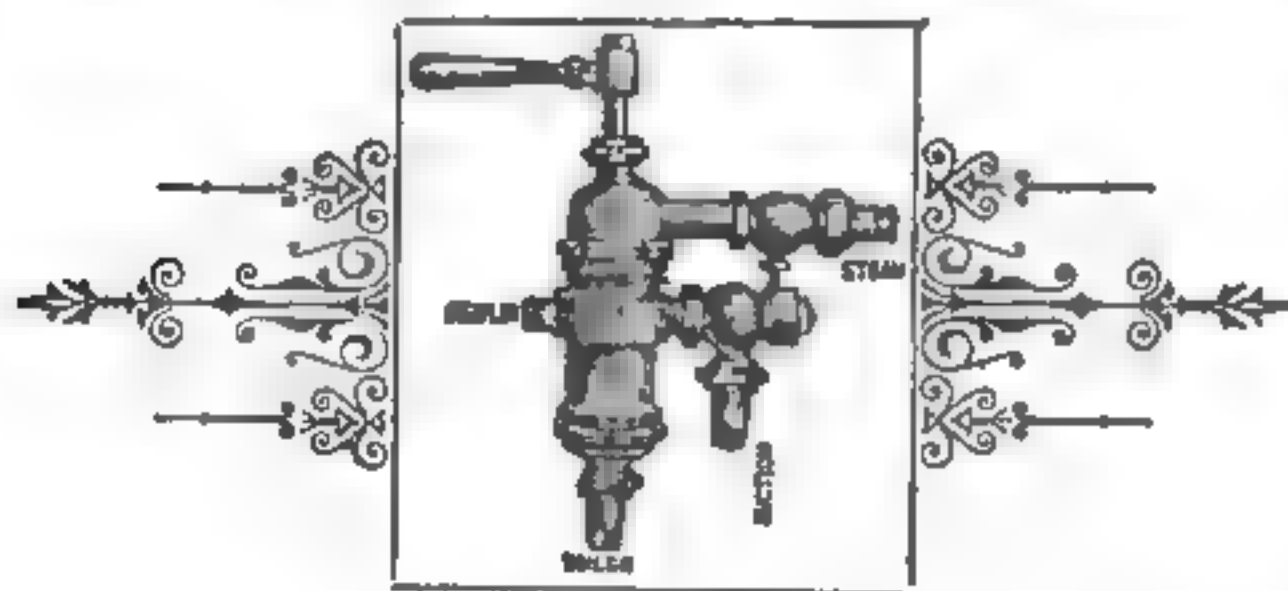
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**THE FLAMMANG
GRADED INJECTOR.**

THE LATEST,

Most Improved, Simplest and Most
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OPERATED ENTIRELY BY ONE HANDLE.

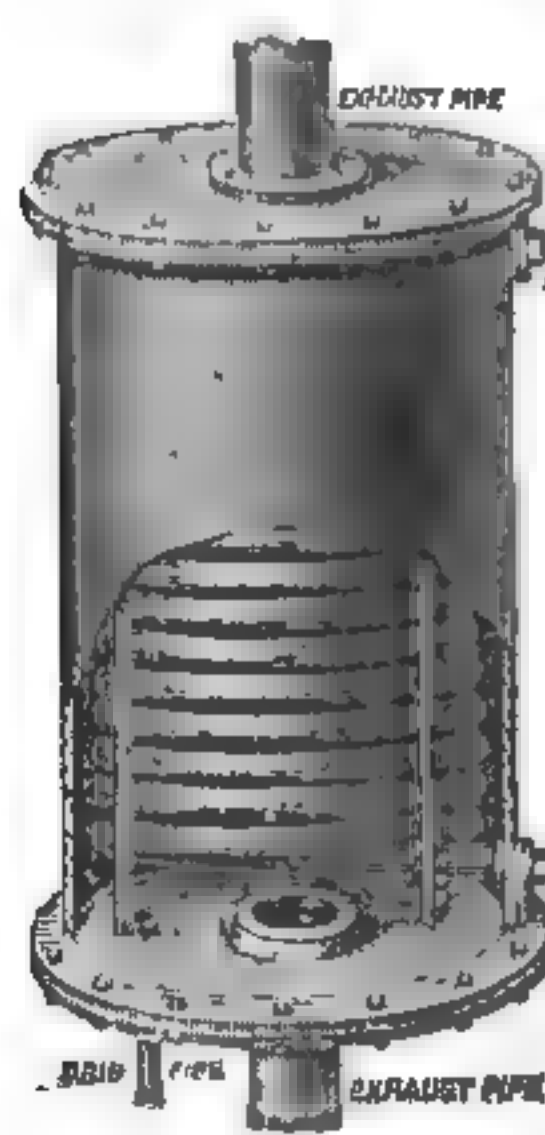


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FEED WATER
HEATER.**

A brass coil heater sup-
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to 212° Fahrenheit by use
of exhaust steam.

Our prices are low and
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and most effective Heater in
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Eight horse Heater, \$17;
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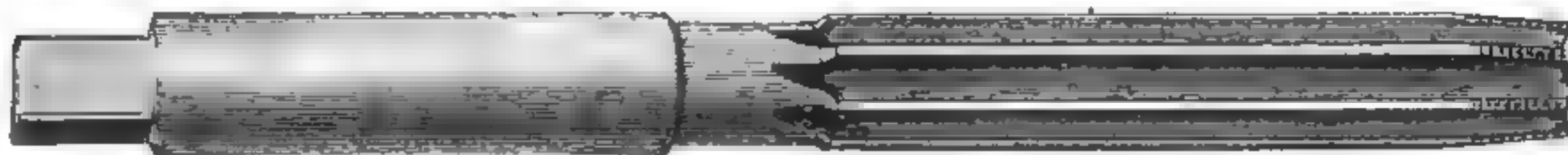
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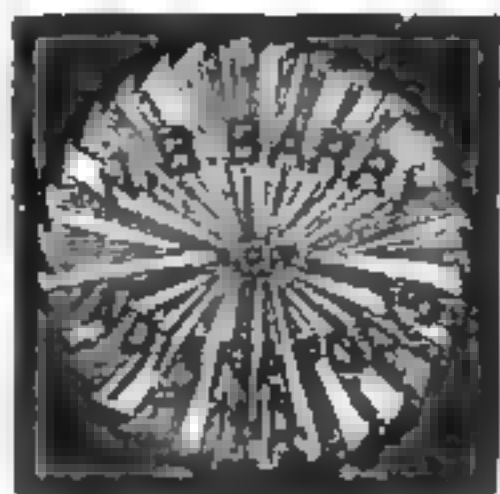


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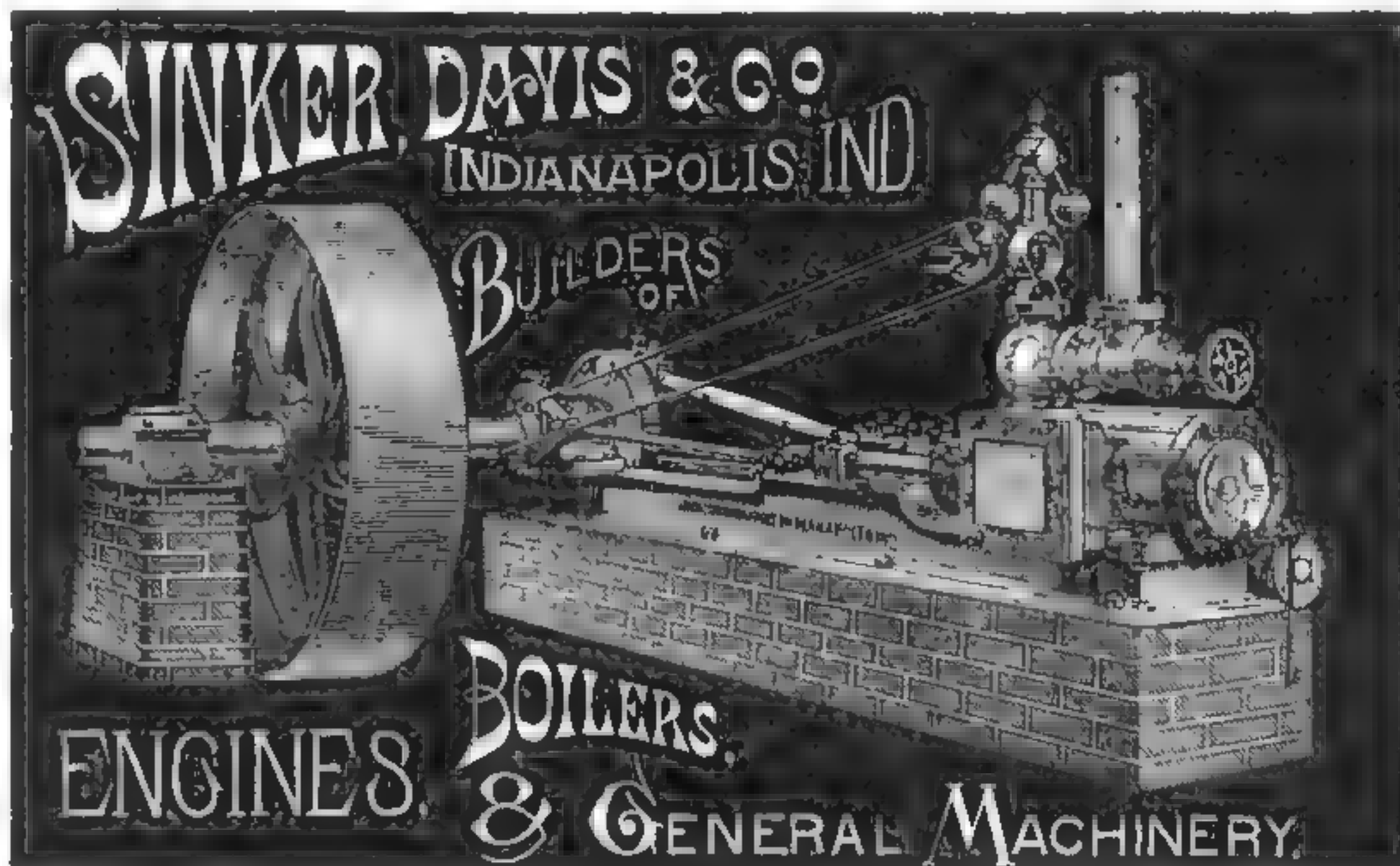


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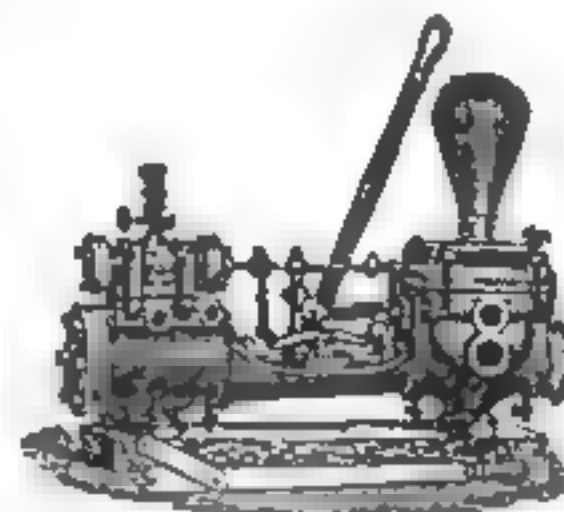


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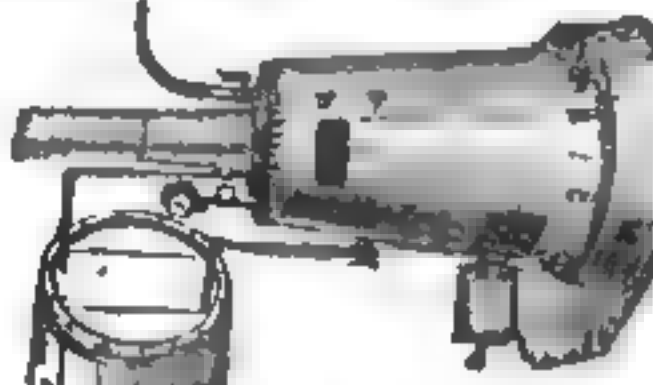
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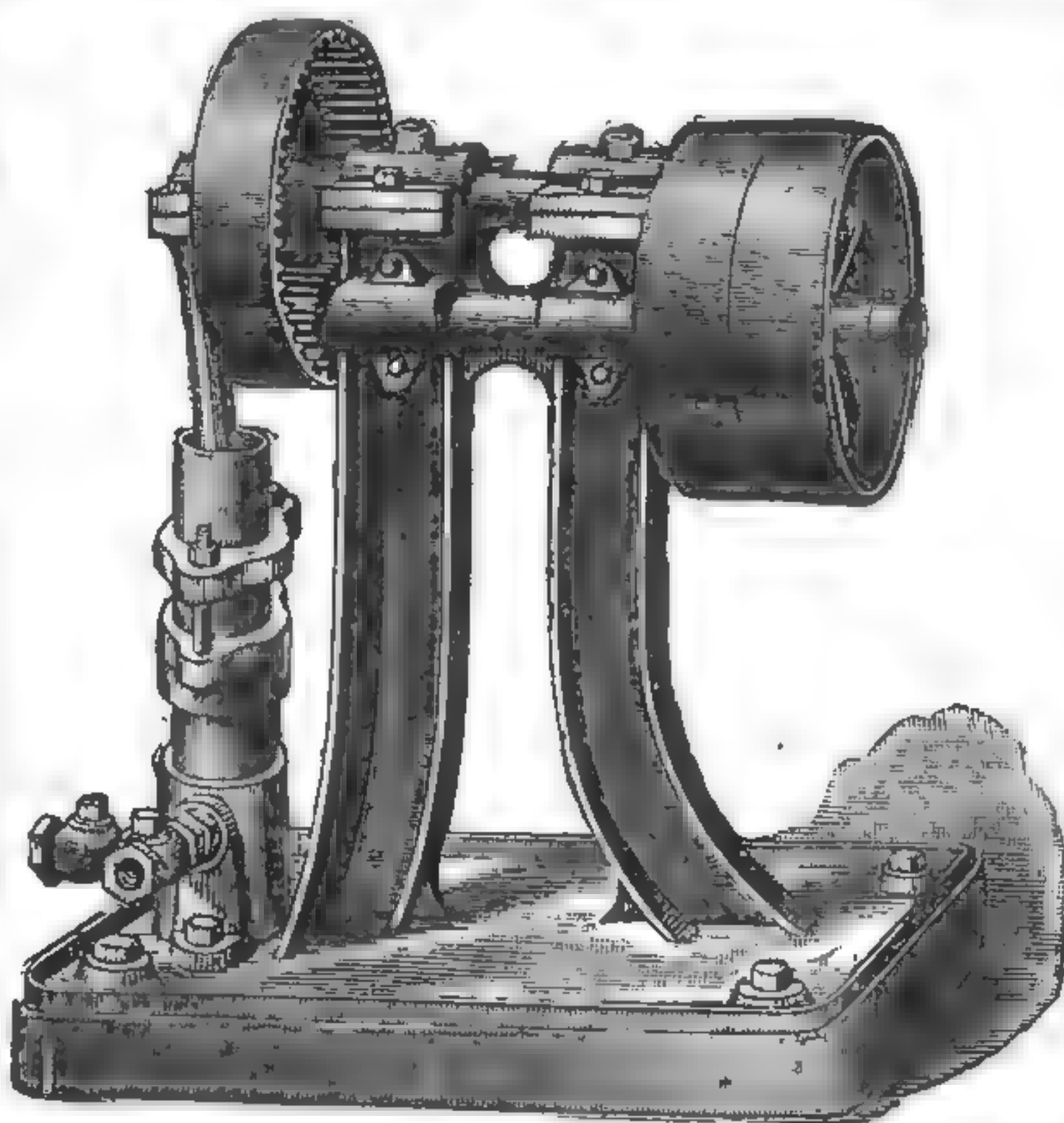
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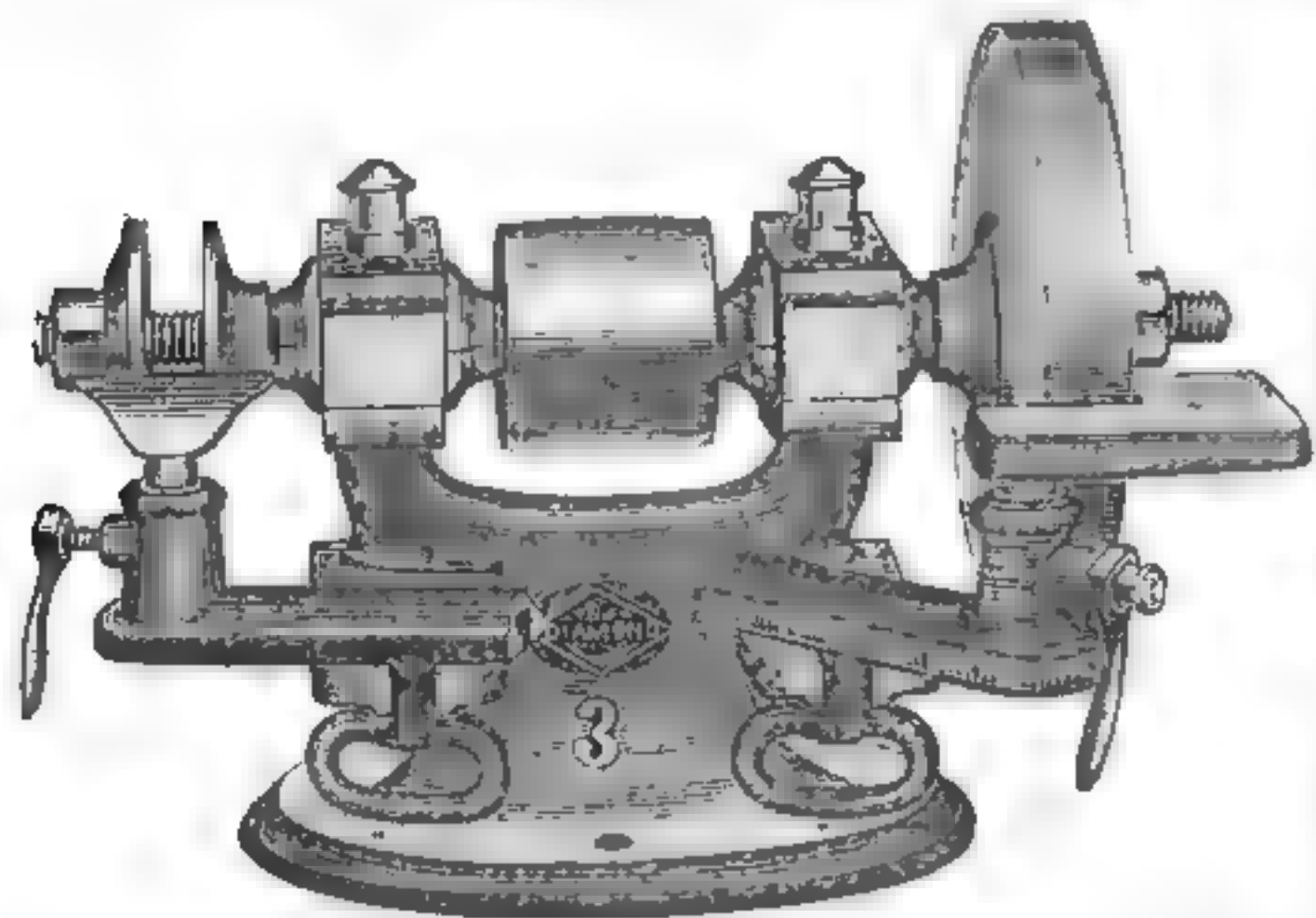
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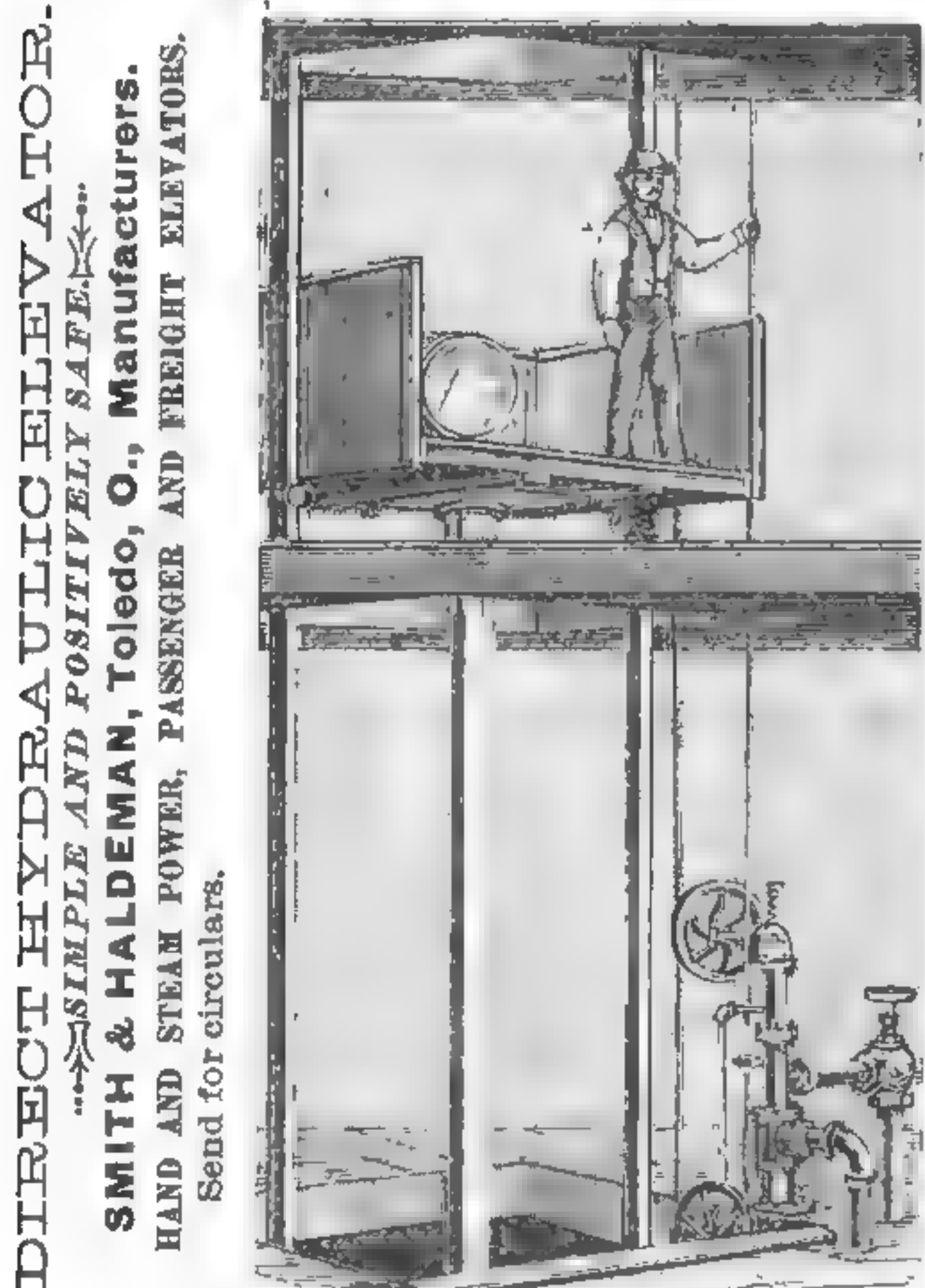
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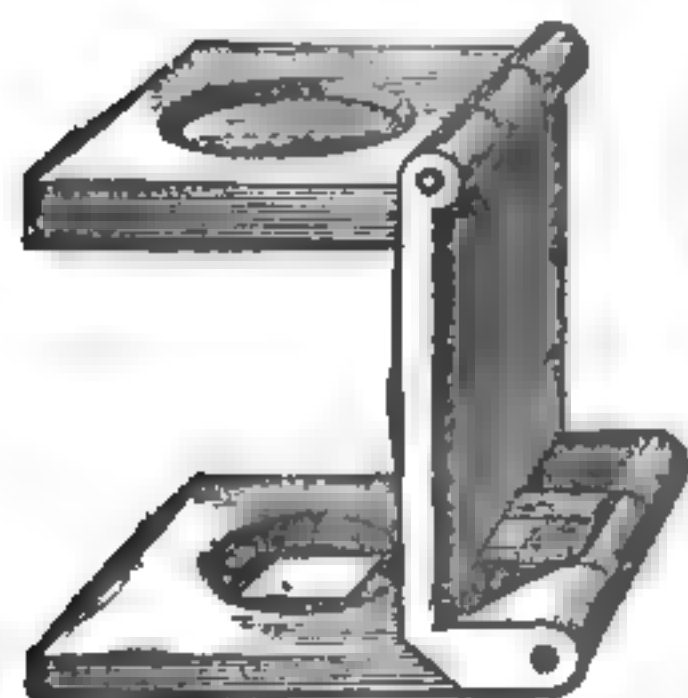
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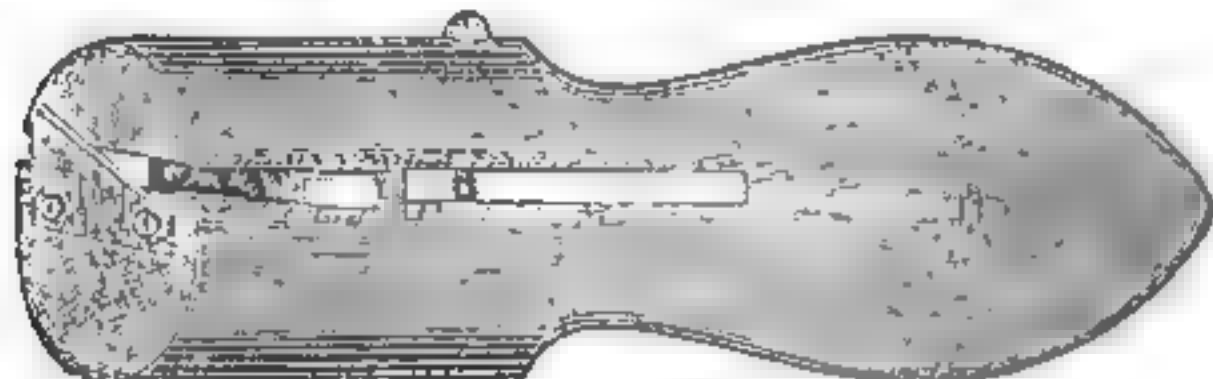


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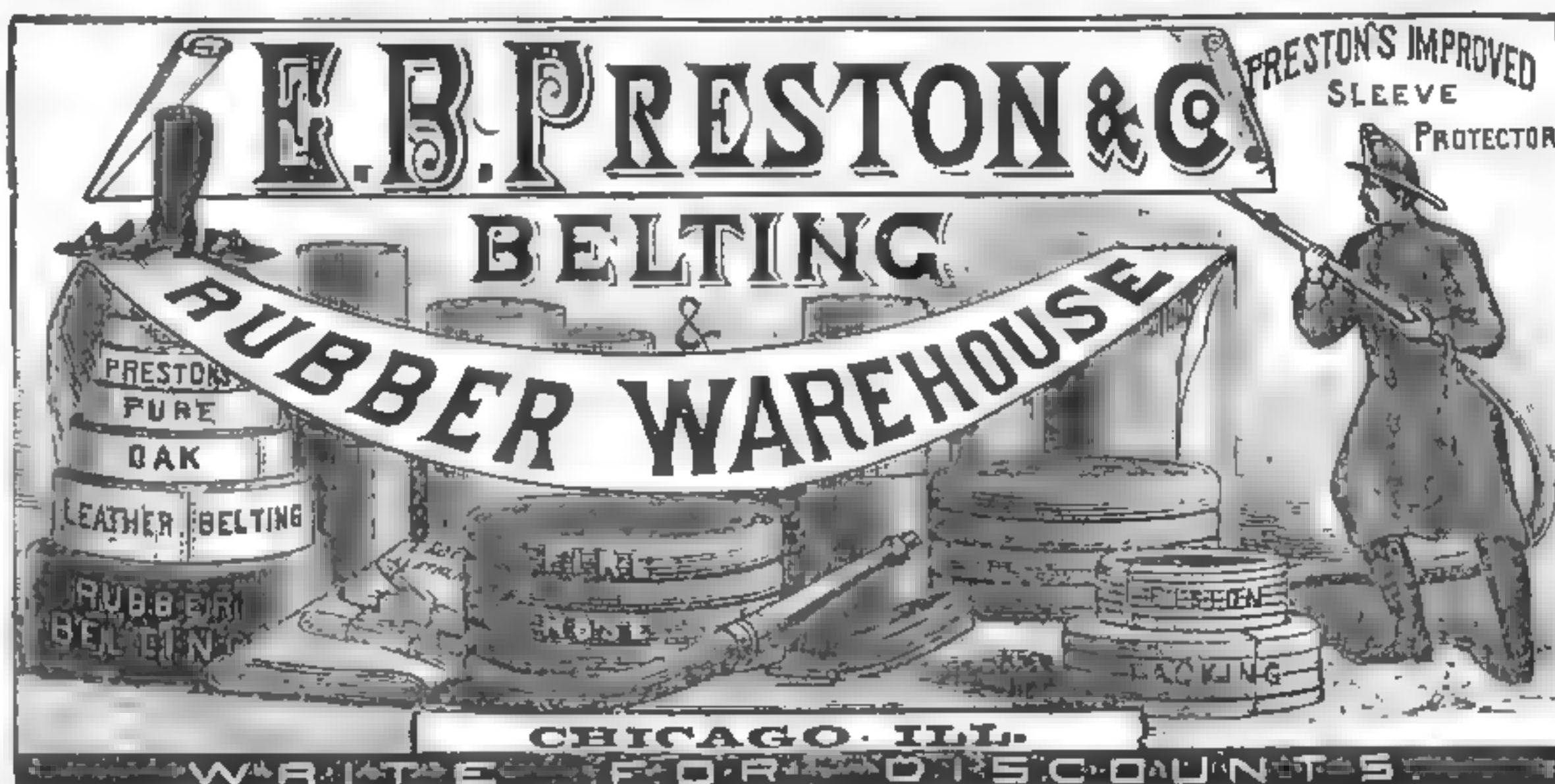
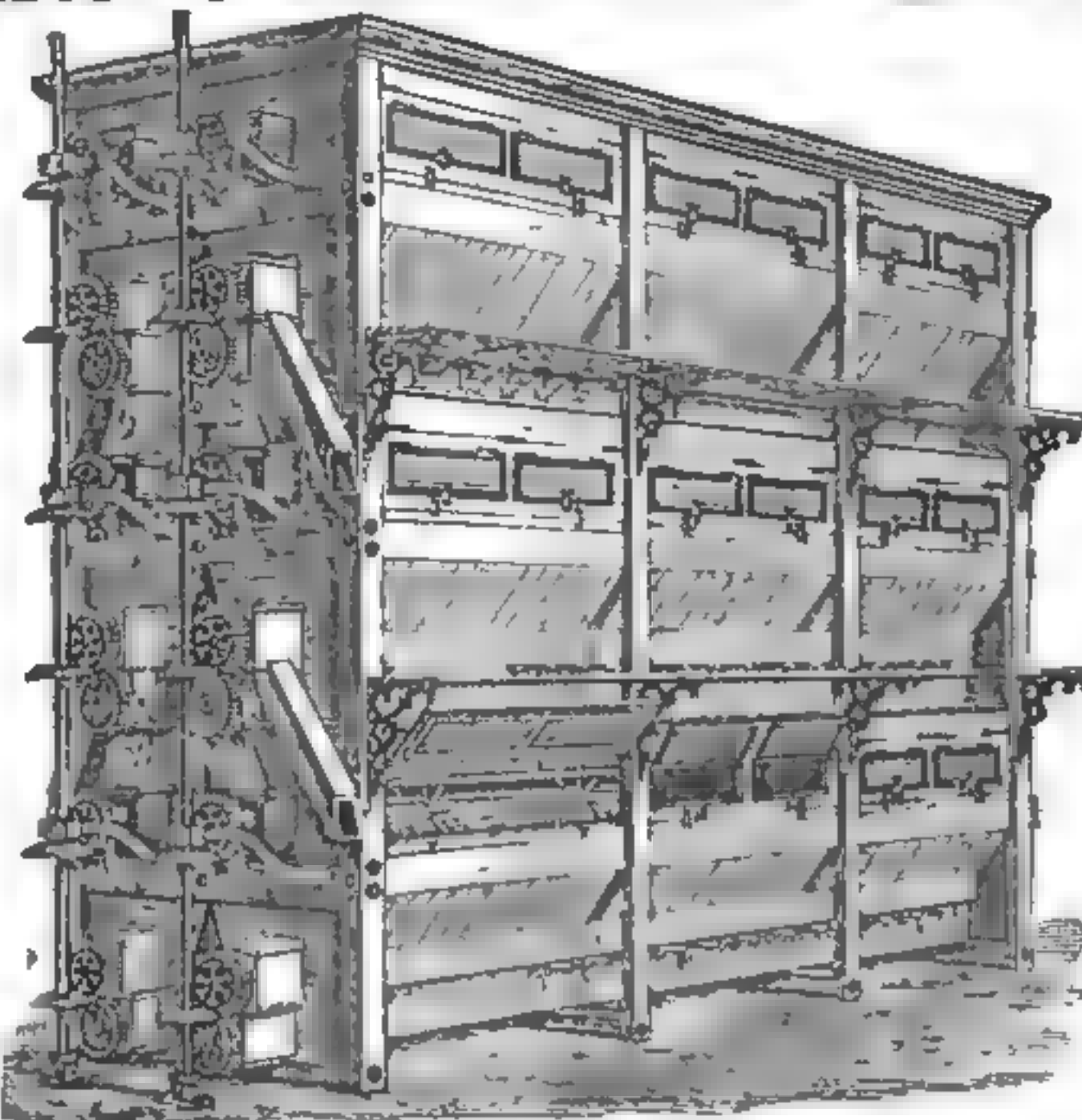
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The "OLD RELIABLE" with Improvements, making It

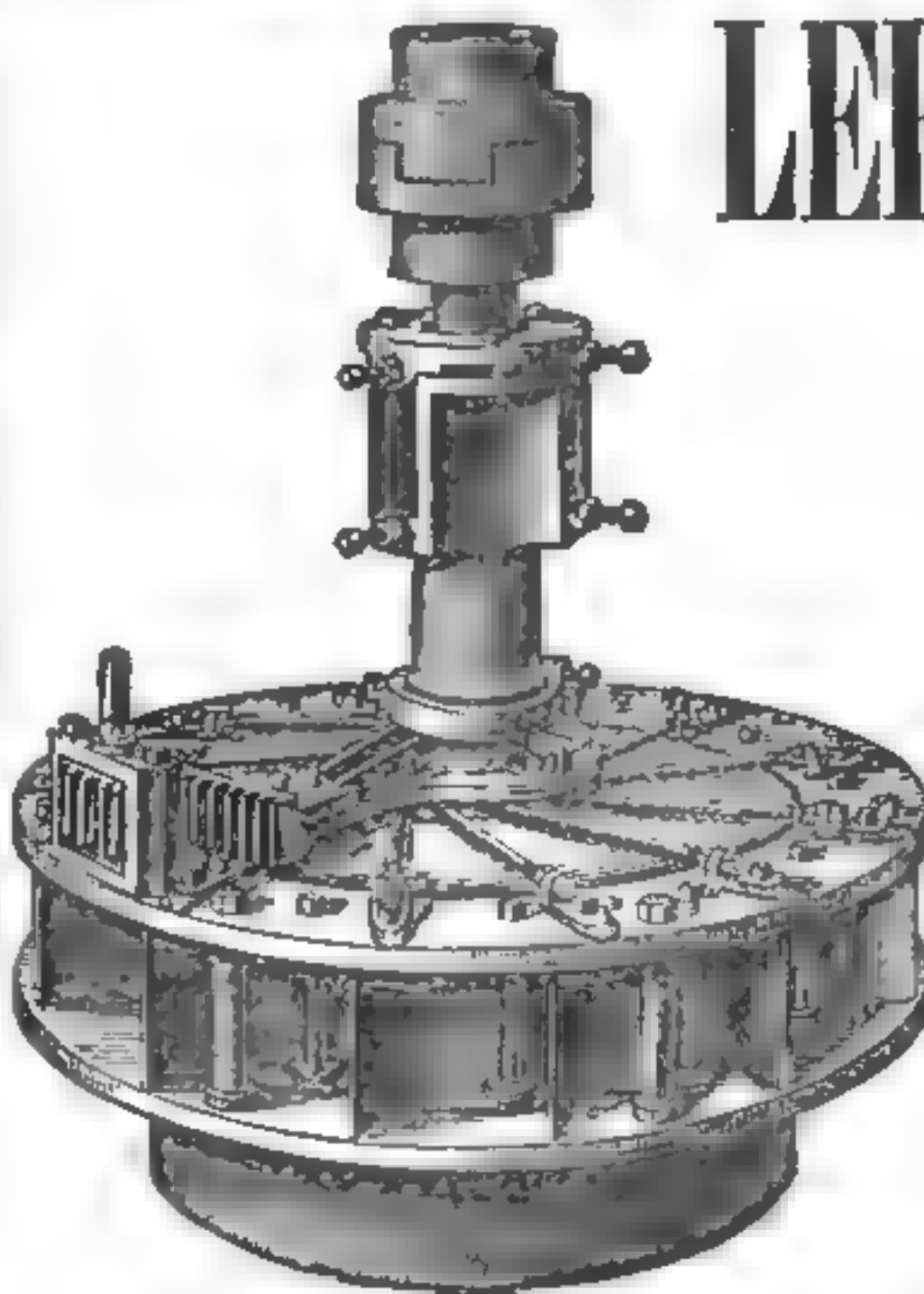
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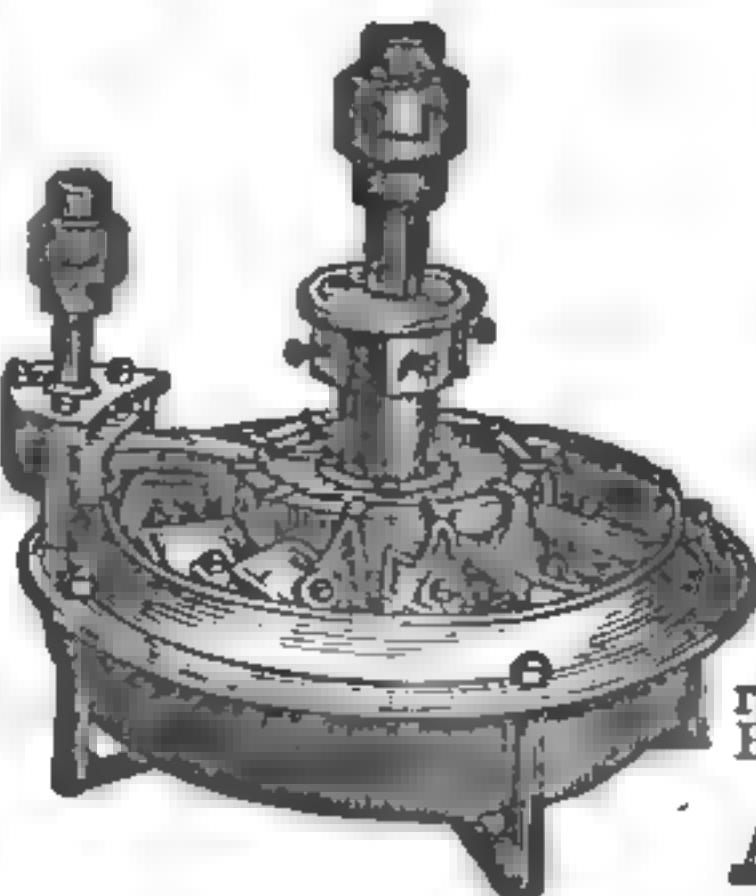
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Warranted equal to the best in EVERY respect, and superior to any other
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THIRTY DAYS' TRIAL given to any responsible party with privilege of
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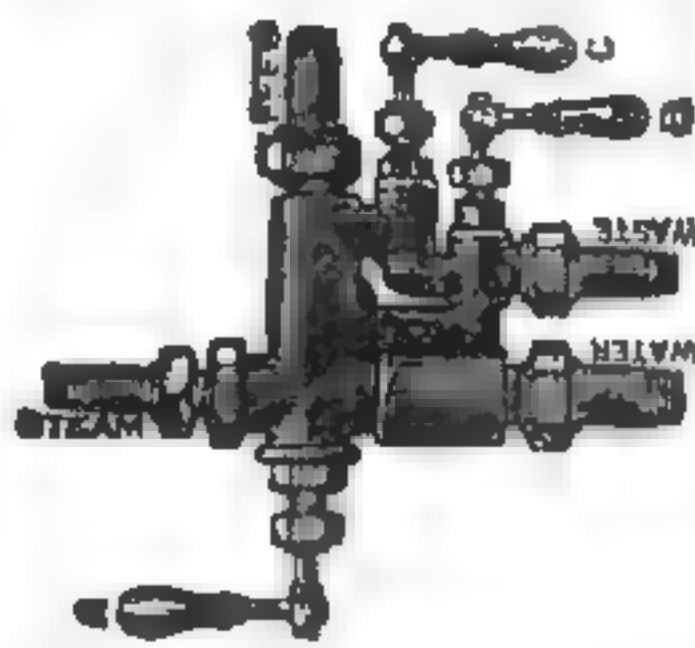
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IMPROVED.
Stands at the Head of all Boiler Feeders.
Simple, Effective and Durable.

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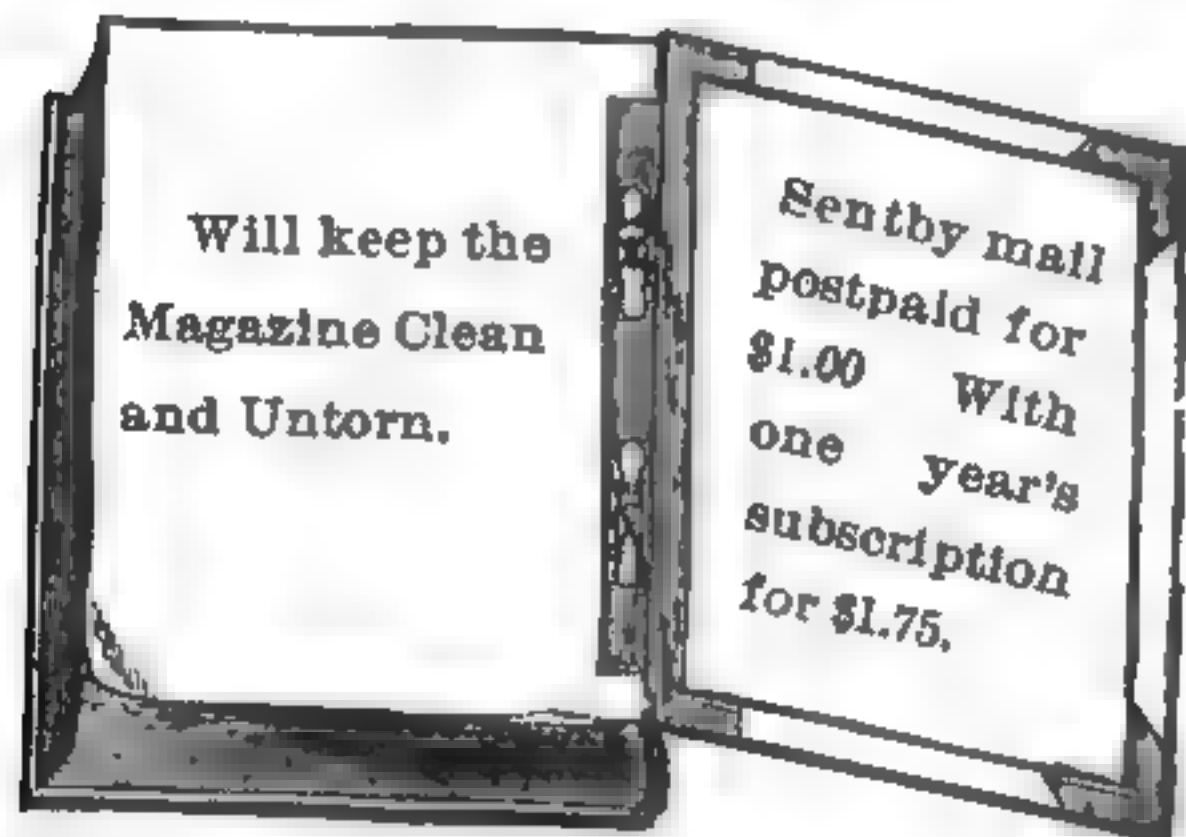
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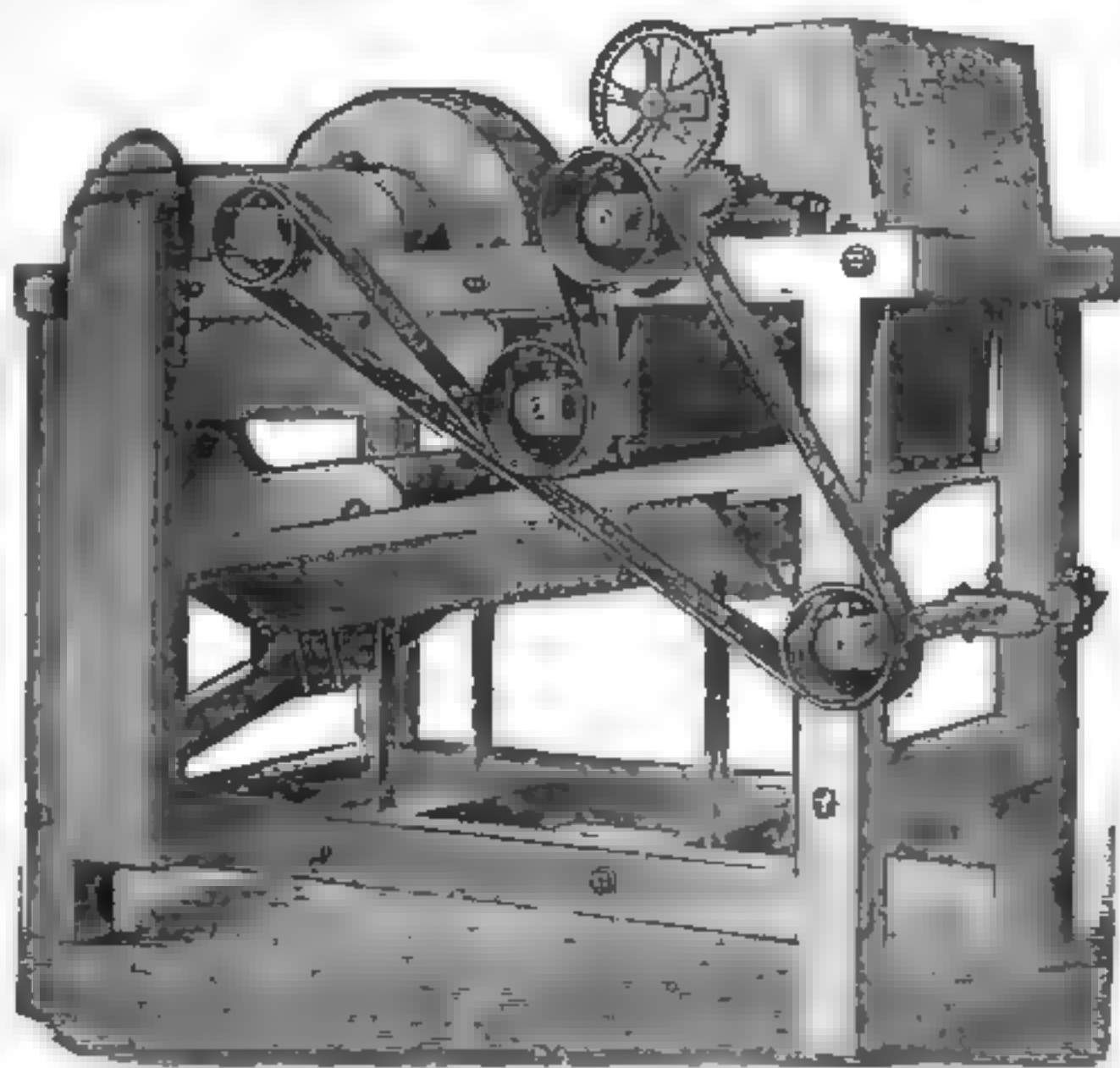
And a Sample Copy will be sent to him, free of charge, postage prepaid.

This paper keeps the Miller posted on all improvements and discoveries relating to the art of milling, receiving special reports from all parts of the United States, and from Germany, Austria, Hungary, Switzerland, England and France. The only German milling paper published in America, and by far the largest, most interesting and finest looking German trade paper published on this continent. Its reading columns are filled with treatises of a scientific and mercantile character and news of real interest to millers and millwrights. A sample copy of the DEUTSCH-AMERIKANISCHE MUELLER is sent to every name on our list who is not a subscriber at regular intervals, and thus an advertisement in our columns for one year will be seen by every one interested in the trade.

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WATEROUS ENGINE WORKS CO.,
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—BY USING—
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SILVER CREEK ROLLER

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—YOU CAN—
Increase your Profits, Better your Quality,
Satisfy your Customers.
Send for full Descriptive Circular, giving prices,
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AND WATER CATCHER
COMBINED.

The most efficient Heater in the market. Also manufacturers of
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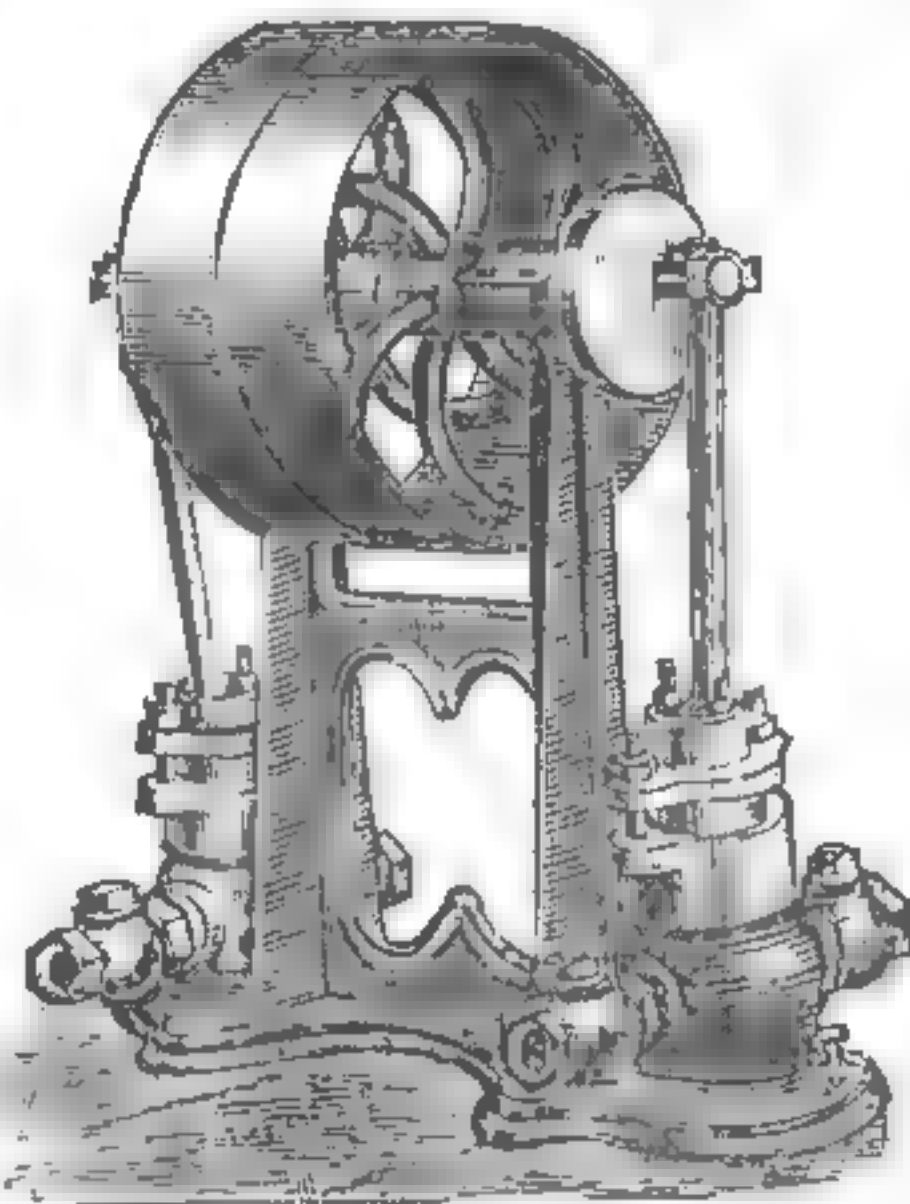
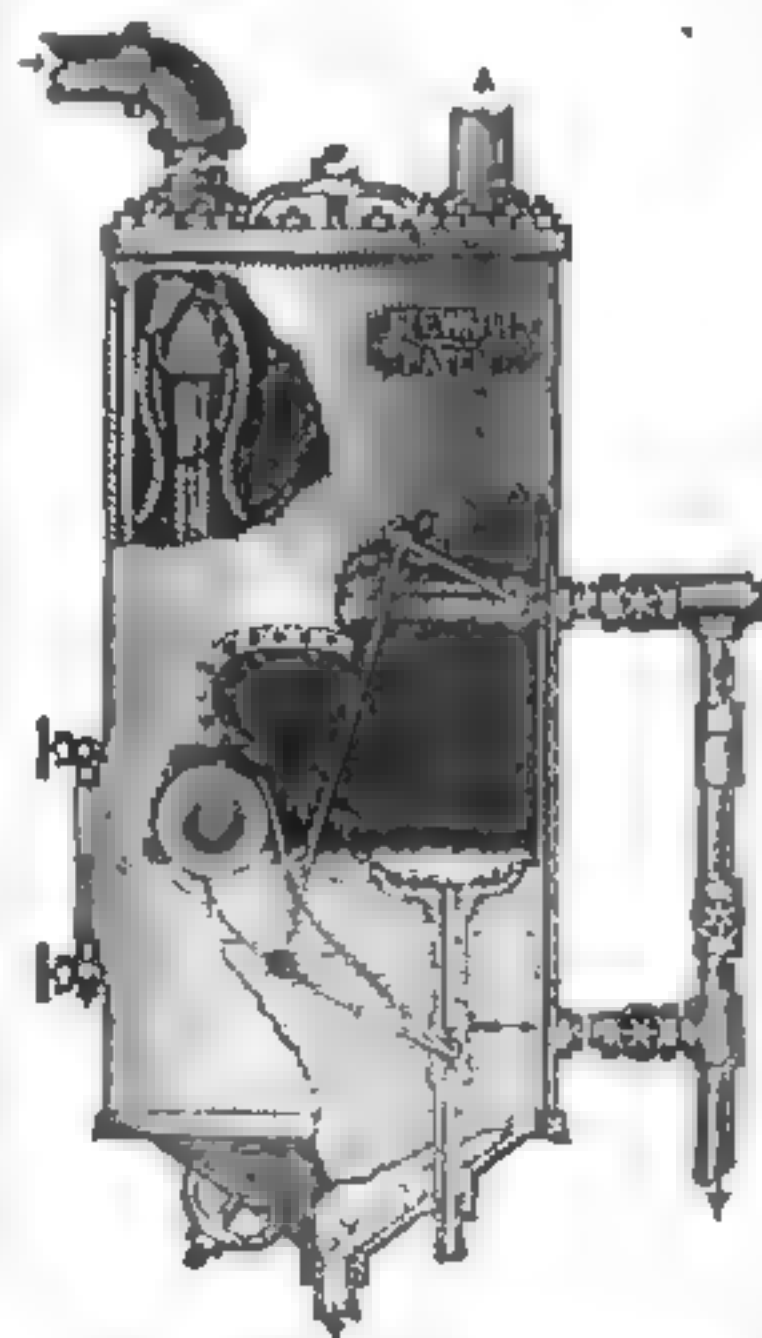
Plunger Boiler Feed Pumps,

With Bronze Metal Valves and Plungers, with new device for Connecting the Rod to Plunger.

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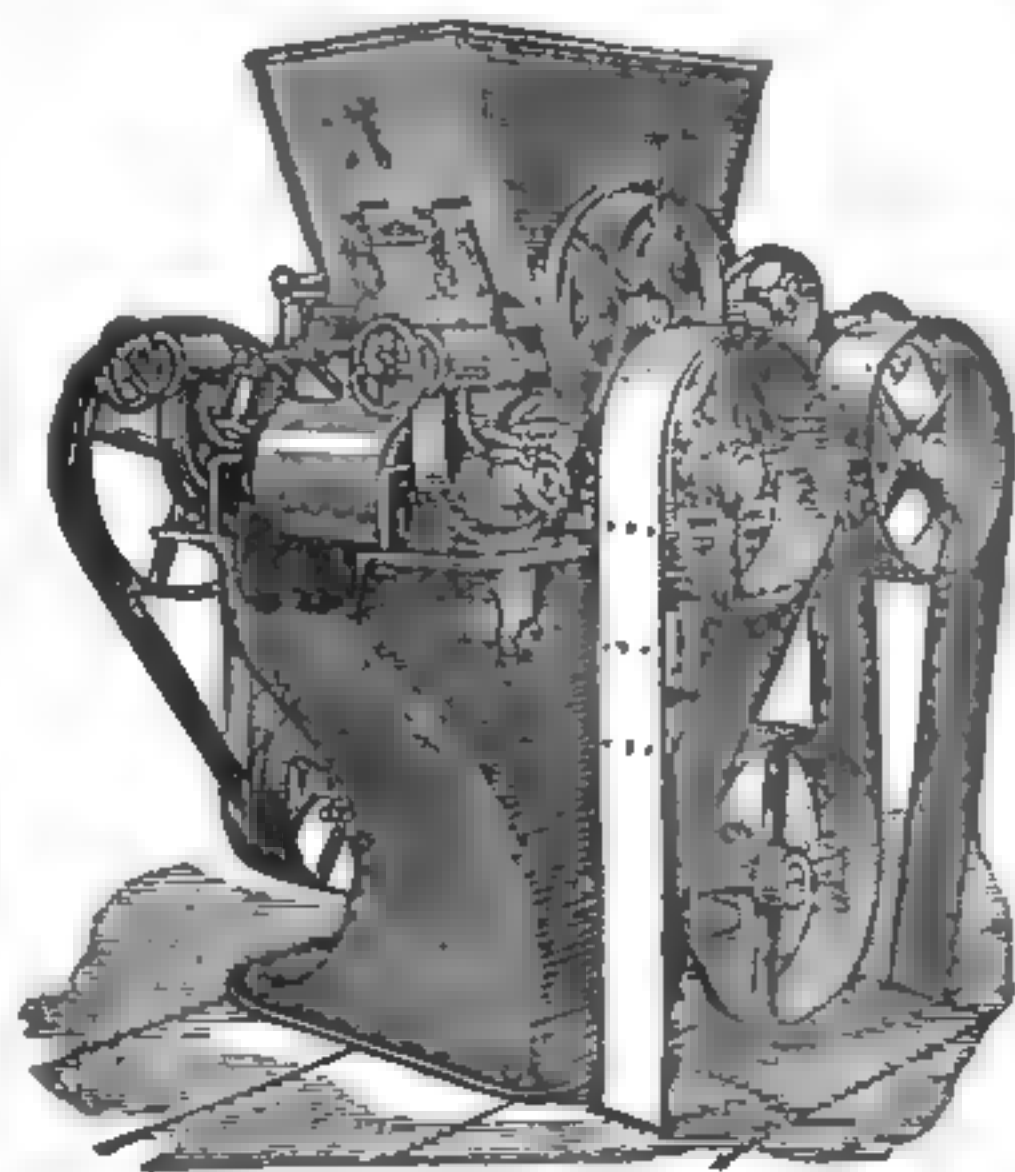
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Complete Plans and Specifications Furnished
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Write for estimates.

THE IMPROVED United States Bran Duster.

The brushes can be adjusted while the machine is in motion.

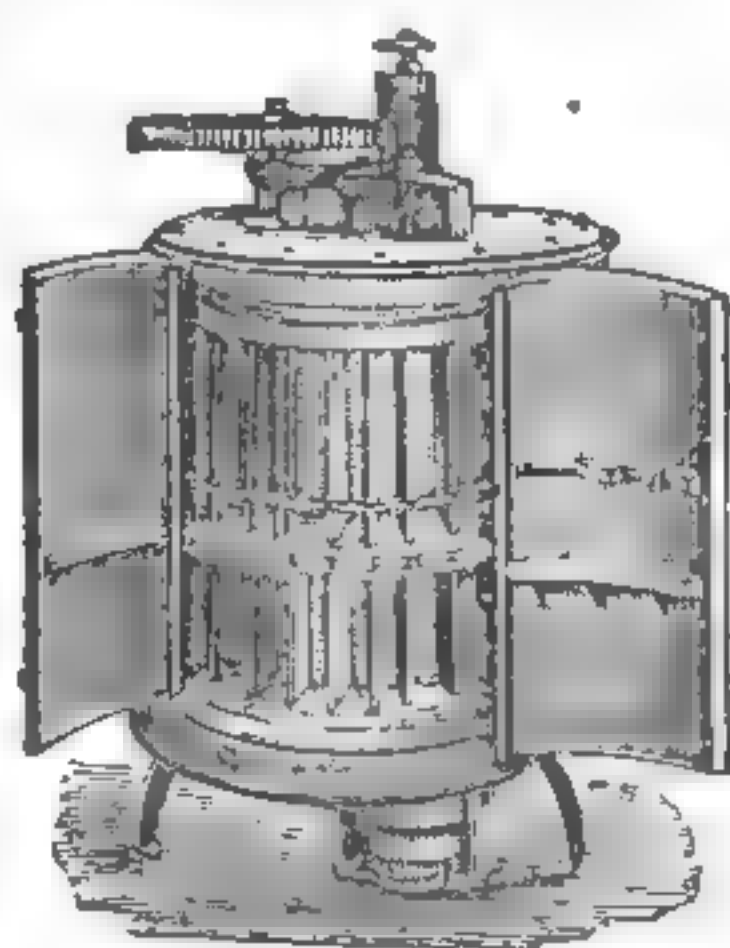
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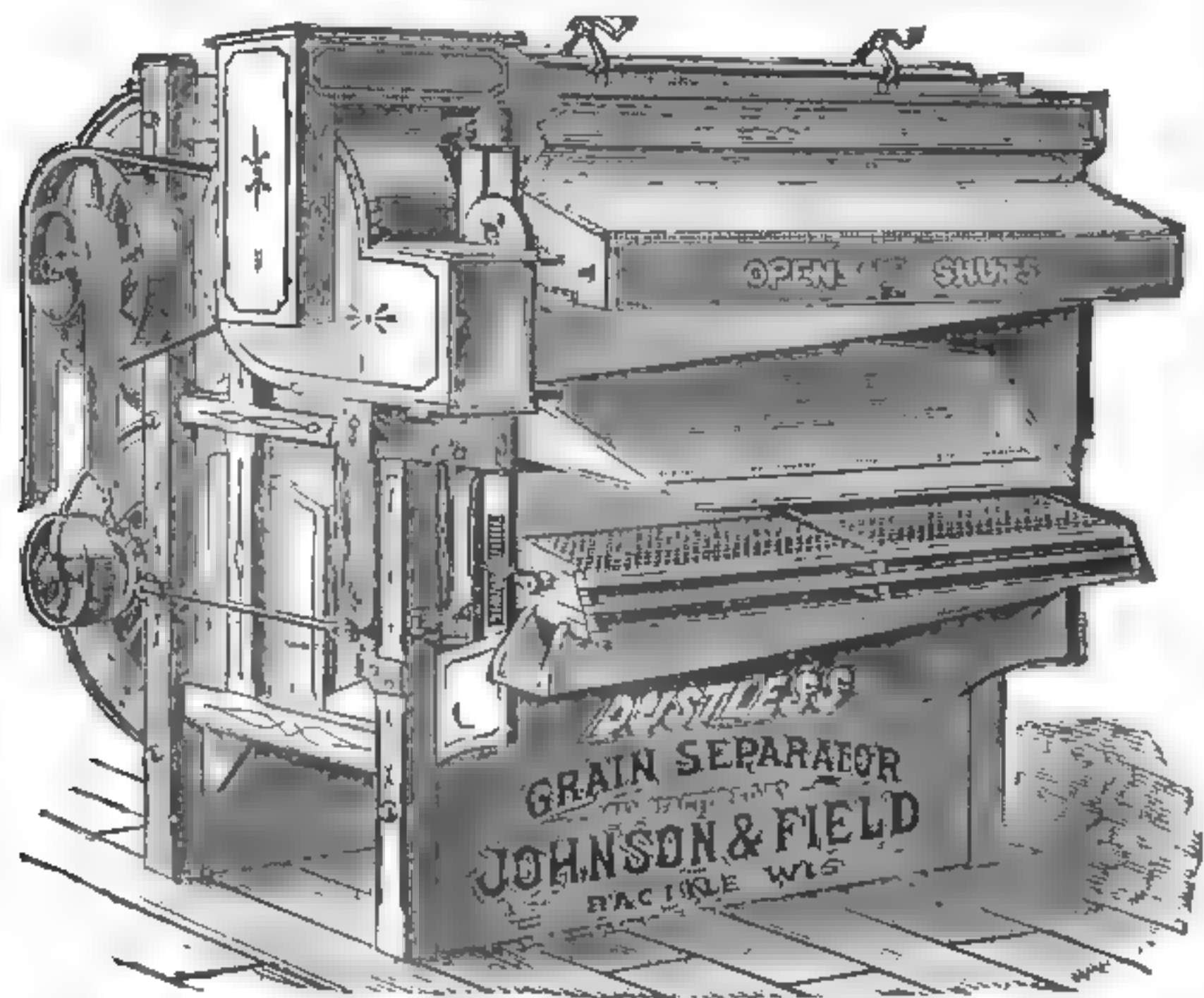
Every Machine Guaranteed to give Satisfaction.

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JOHNSON & FIELD'S Dustless GRAIN Separator

EMBODIES MORE POINTS OF EXCELLENCE

Than any other machine now offered for similar purposes. *Light Running, Large in Capacity, Perfect in Separation, and with great Strength and Durability.* These machines have no equal. *Adopted and Indorsed* by many of the largest elevators in the country.

AS A GRADER IT HAS NO EQUAL!

Made in Different Sizes to Suit Different Requirements.
Send for Circular, with Testimonials
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THORNBURGH & GLESSNER,

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Will send to any reader of "The Millstone" a copy of their New and
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SEND FOR IT!

2,500

Improved Prinz Patent Dust Collectors IN SUCCESSFUL OPERATION.

WHAT THE LEADING MILL FURNISHERS SAY:

Milwaukee Dust Collector Manufacturing Co.

GENTLEMEN: I take pleasure in stating that I have seen your Dust Collector in operation, and with my experience with dust collectors I consider yours the most perfect machine which has come to my knowledge heretofore. I think it is all any miller could ask for, and I have adopted it in mills which I am building.

OFFICE OF E. P. ALLIS & Co., RELIANCE WORKS, MILWAUKEE, Dec. 6, 1882.

Yours truly, WM. D. GRAY, Expert Millwright.

SPECIAL NOTICE!

We have lately entirely re-constructed our machine as far as mechanical details are concerned, and we claim it is far superior in construction to any other machine, and equal to the well recognized principle.

Machines also Manufactured

with

FAN ATTACHMENT.



Prinz Patent Improved Dust Collector.

BEWARE OF INFRINGEMENTS!

Prinz Patent Numbers:
272,473 and 272,474

Consolidated Licensees' Patent Numbers

63,325	235,376	251,121
125,518	235,197	258,875
149,434	239,755	258,876
171,973	248,984	258,878
207,585	250,813	259,875
211,033	251,120	259,876
228,023		AND OTHERS

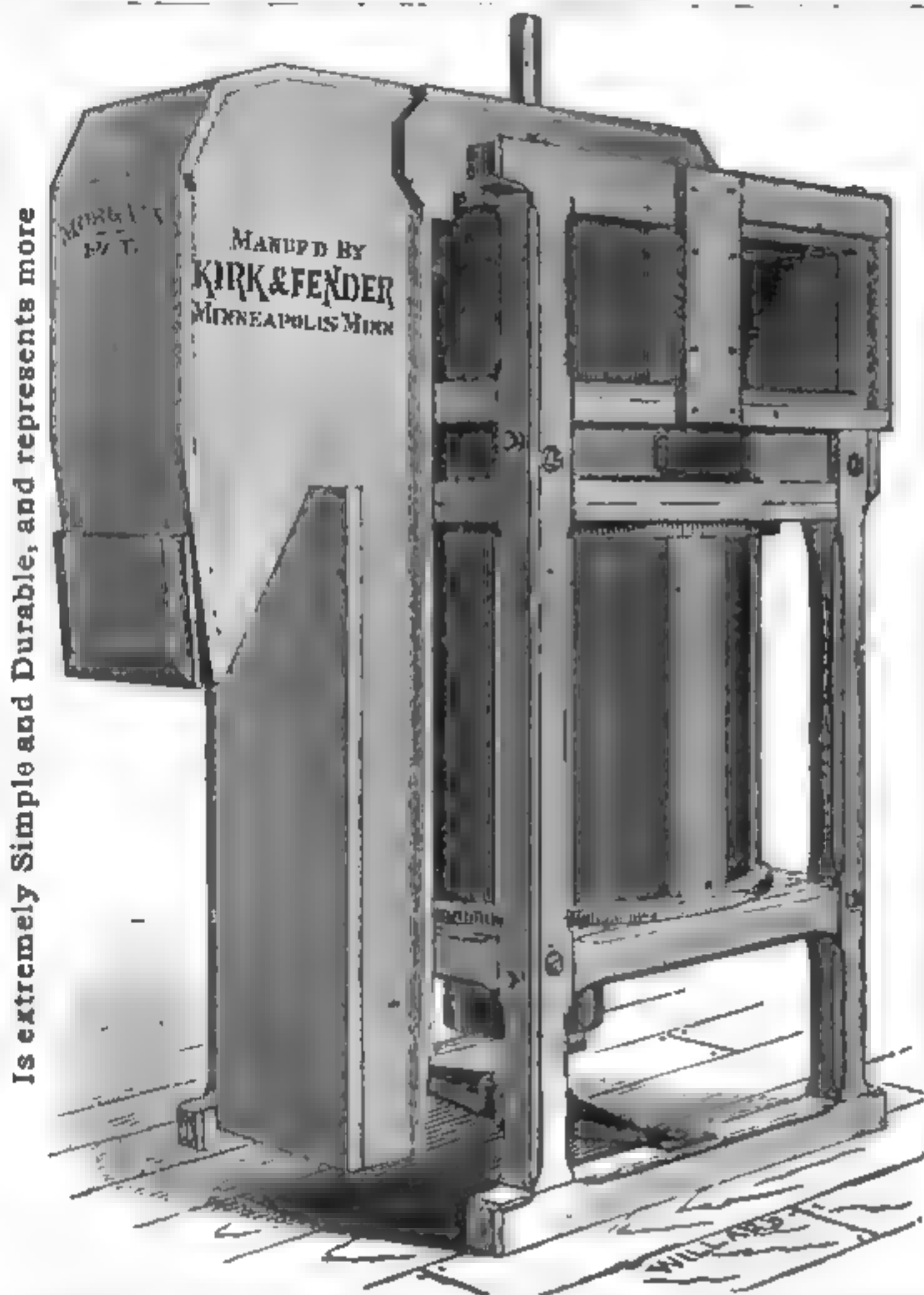
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**MILWAUKEE
DUST COLLECTOR MFG. CO.**

Milwaukee, Wis.

KING

OF WHEAT CLEANING MACHINERY.



Is extremely Simple and Durable, and represents more

profit to the miller than any other cleaning machine.

MORGAN SCOURER & POLISHER.

QUEEN

OF THE MILLING HOUSEHOLD.



Is a neat housekeeper and saves much

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PEERLESS DUST CATCHER.

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Gentlemen—We have now been using the Peerless Dust Catcher procured from you for three months and are happy to be able to say that it gives us entire satisfaction in all respects. Among all the improvements of modern milling we consider good dust collectors the greatest. Yours truly,
COWGILL & HILL.

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J. W. KAUFFMAN.

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Gentlemen—We have been using a Morgan Scourer ever since starting our new mill. We have it behind a Moline Separator and Kurth Cockle Machine and find it does its work to our entire satisfaction. As all our machinery is of the latest improvement we find yours equal to any in the market. Yours Resp'y,
PIERCE MILL CO.

THEY ARE SURE TO PLEASE.

KIRK & FENDER, Minneapolis,
SOLE MANUFACTURERS.



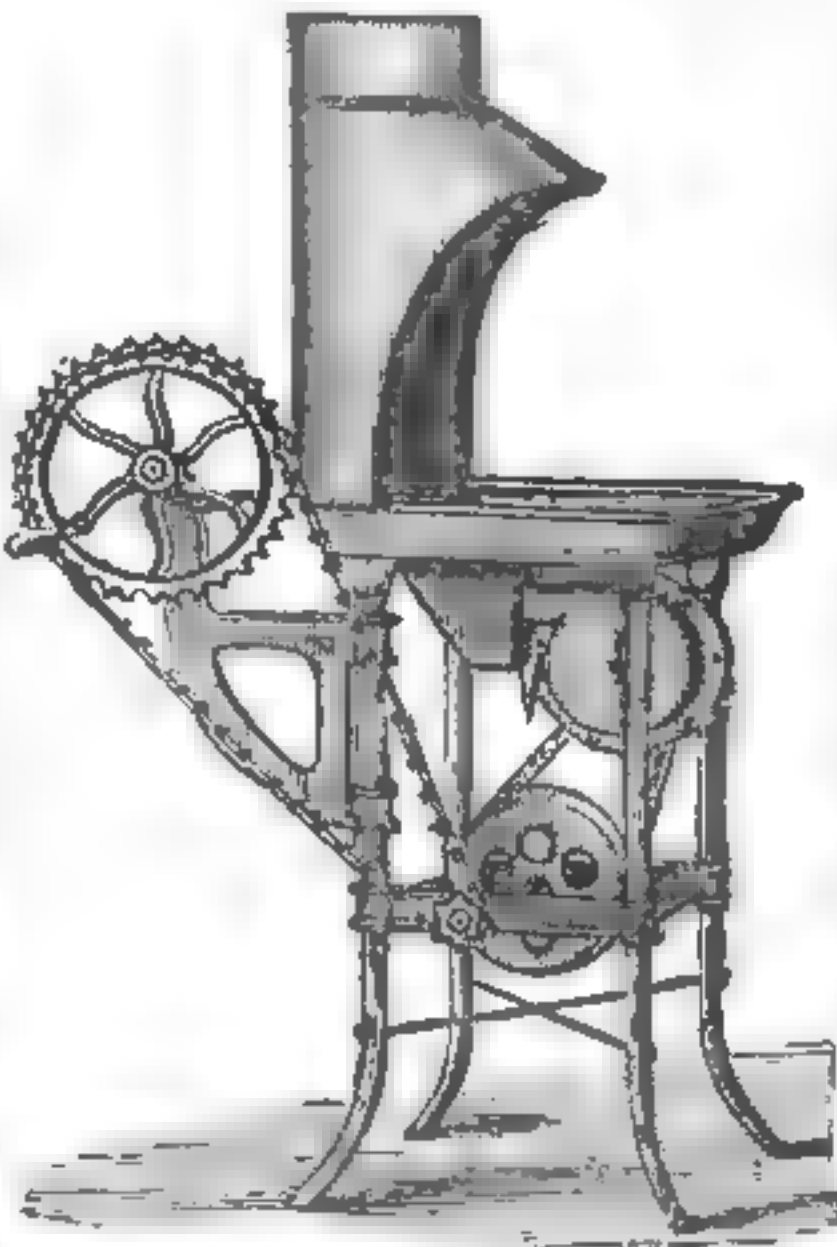
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MANUFACTURERS OF
GRINDSTONES

Suitable for all purposes.

3 River St., CLEVELAND, O.

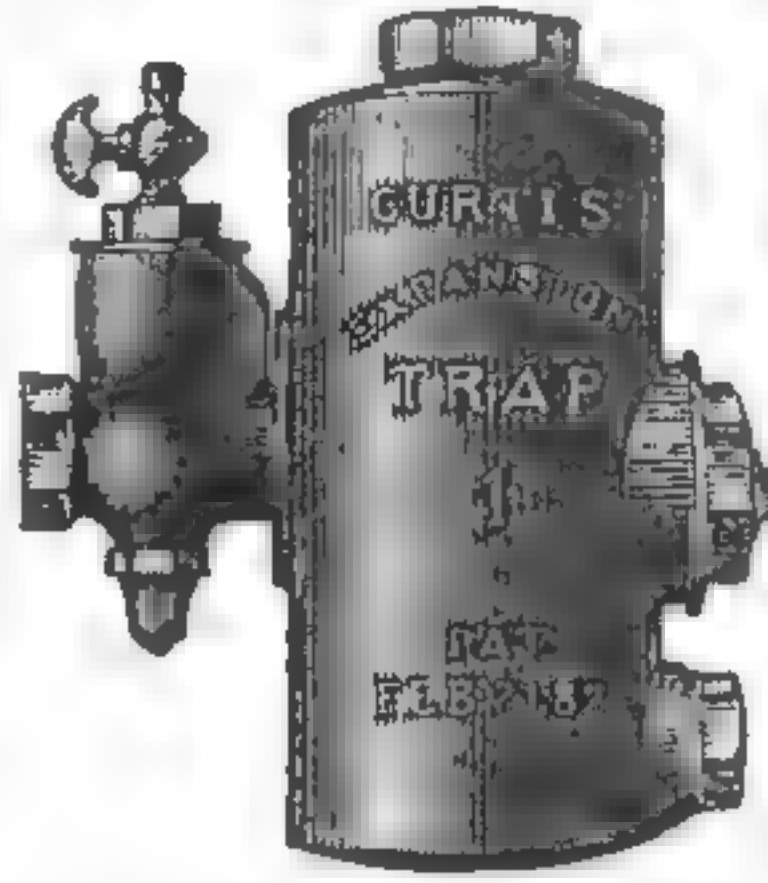


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Portable Forge.
BEST IN THE MARKET.



Strong blast and easily worked, durable and gives entire satisfaction. All sizes for every kind of work. Also PRESSURE BLOWERS AND EXHAUSTERS. Send for catalogue.
Keystone Portable Forge Co., 204 North Fourth-st., PHILADELPHIA, PA.

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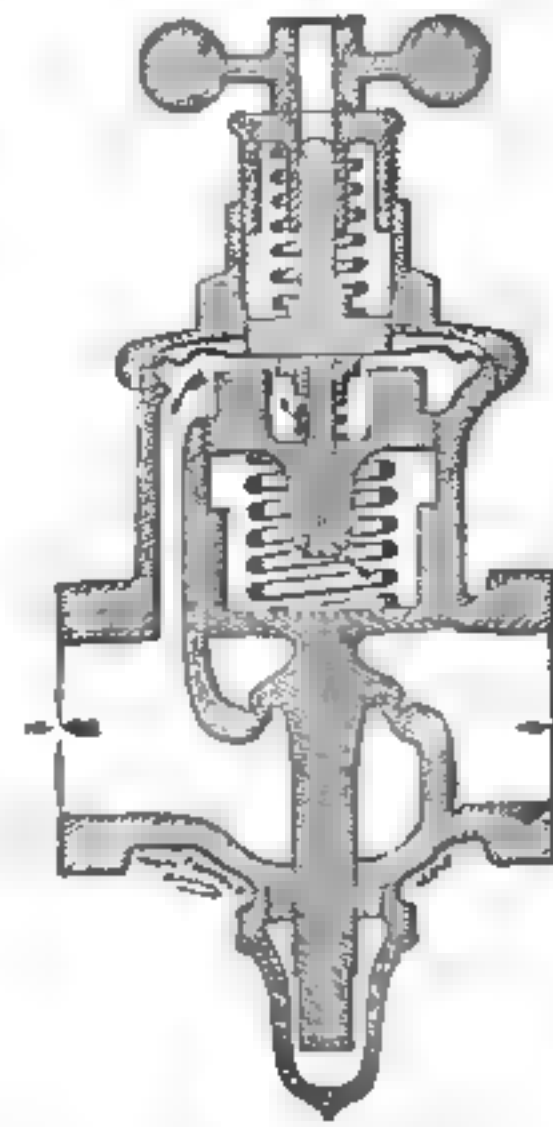


Discharges water at any temperature below 212°.

Discharges Air as freely as water.

Write for circular.

CURTIS REGULATOR CO.,
159 Beverly street, Boston, Mass.



CURTIS PRESSURE REGULATOR

—FOR—

STEAM, WATER AND AIR
Write for Circular. Manufactured by

CURTIS REGULATOR CO.
159 Beverly-st., BOSTON

GENERAL AGENCIES:
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HOLT'S PORTABLE FORGES!
5 DIFFERENT SIZES.
For all kinds of work. Prices from \$10 upwards. Send for Circular.
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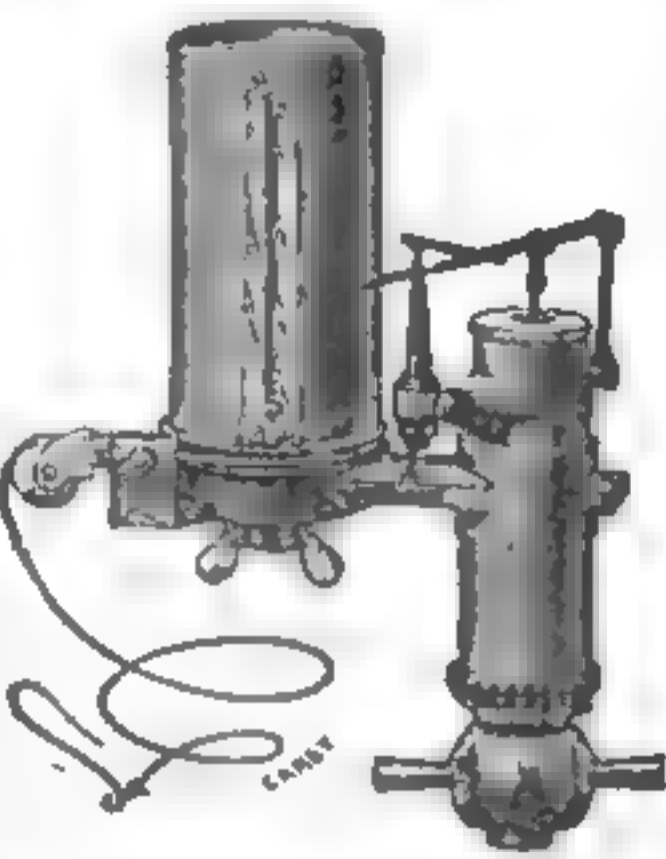
IMPROVED THOMPSON STEAM ENGINE

INDICATOR,

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AND
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Manufactured solely by

THE
American Steam Gauge Co.,
Original Steam Gauge Co. Business established in 1851. Incorporated in 1854.

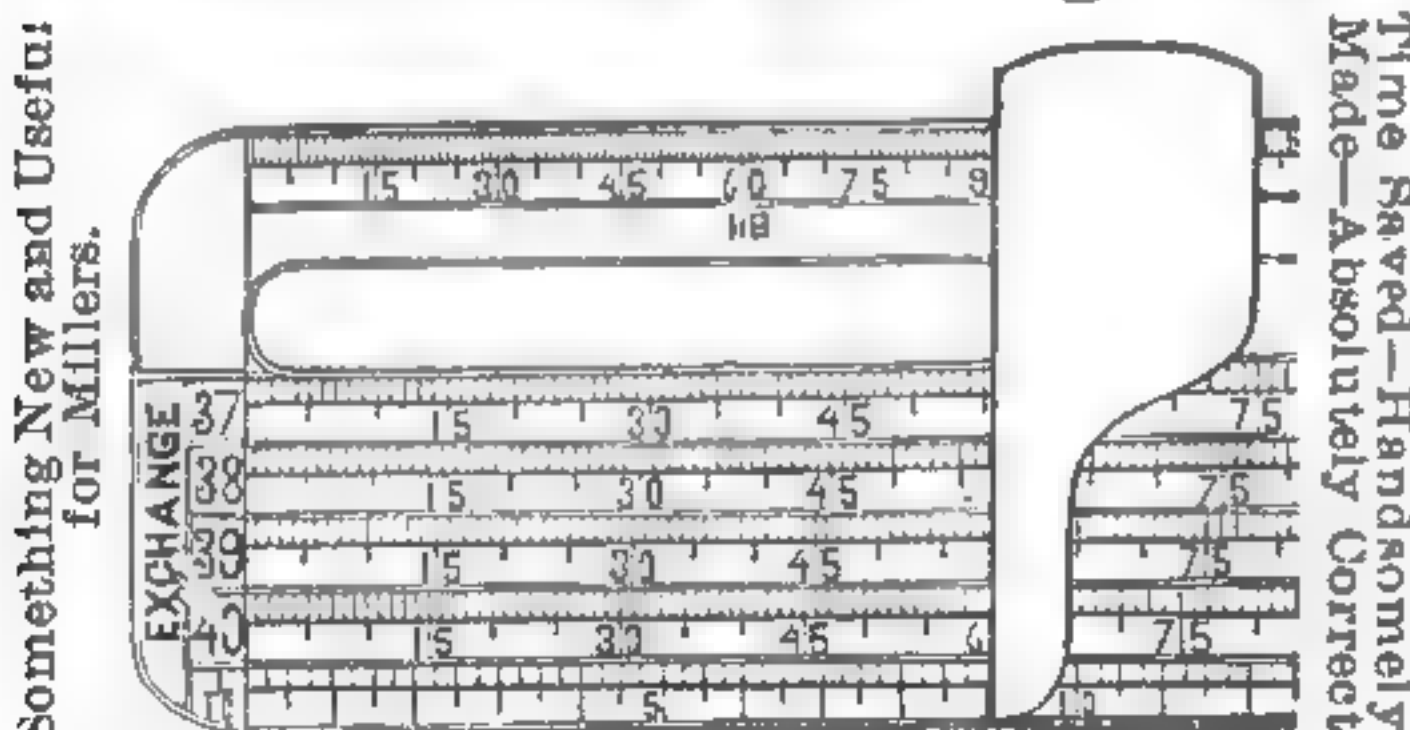


36 Chardon Street, Boston, Mass.

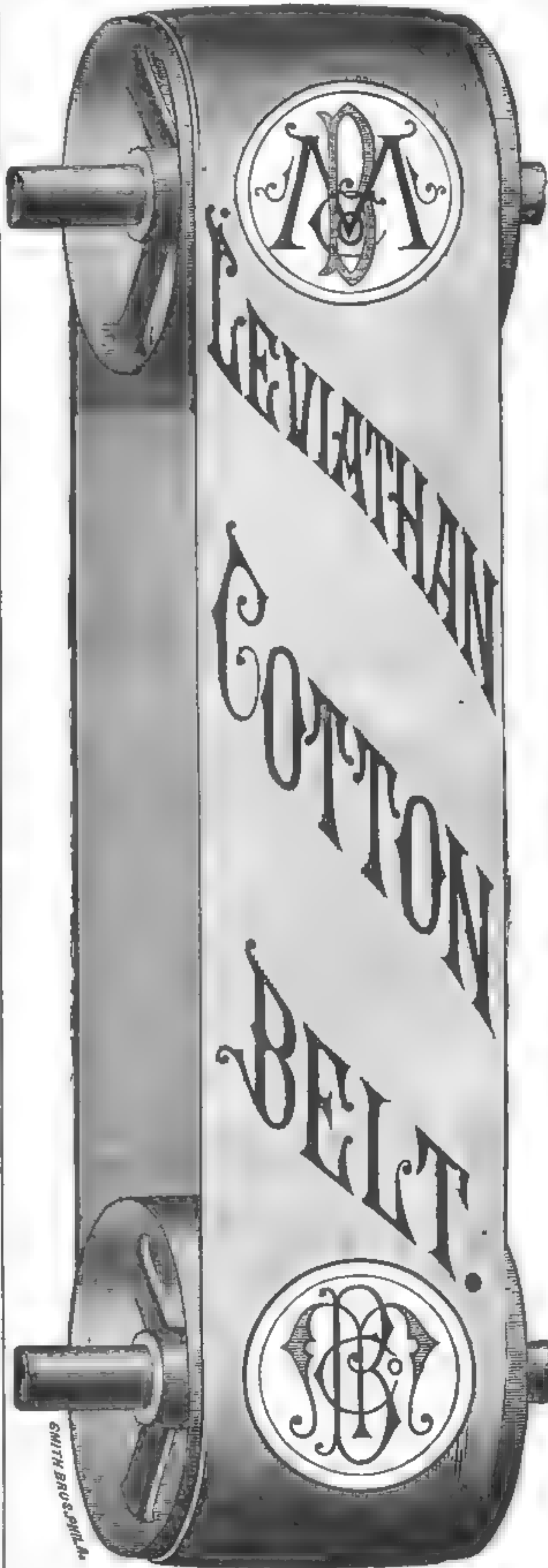
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KREHL, HAUSER & CO.,
Tanners and Manufacturers of
Leather Belting
HARNESS,
FAIR LINE AND COLLAR LEATHER.
Girard, O.

Millers' Toll and Exchange Rule.



Sectional view. Full size 2 feet and 2 3/4 inches. The above cut shows a section of the Millers' Toll and Exchange Rule. This rule is made of wood, and so graduated as to show at a glance how much flour to give in exchange for a given quantity of wheat. It is so graduated that exchange can be taken from one pound to 600 pounds. The opposite side exchanges from 33 to 36 pounds, inclusive. This is as necessary for every miller to have as a wood-rule is to a dealer in lumber—for by its use a miller saves his time in figuring his exchange, and is less liable to mistakes. This is the most useful article in a mill. There are hundreds of them in use in all parts of the United States and Canada. Price, with one year's subscription to THE MILLSTONE, \$2 00. Address THE MILLSTONE, - - Indianapolis, Ind.



MAIN BELTING COMPANY,

MANUFACTURERS OF THE

LEVIATHAN Cotton Belting.

MADE OF ANY

Length, Width and Strength

—FOR—

Main Driving Belts

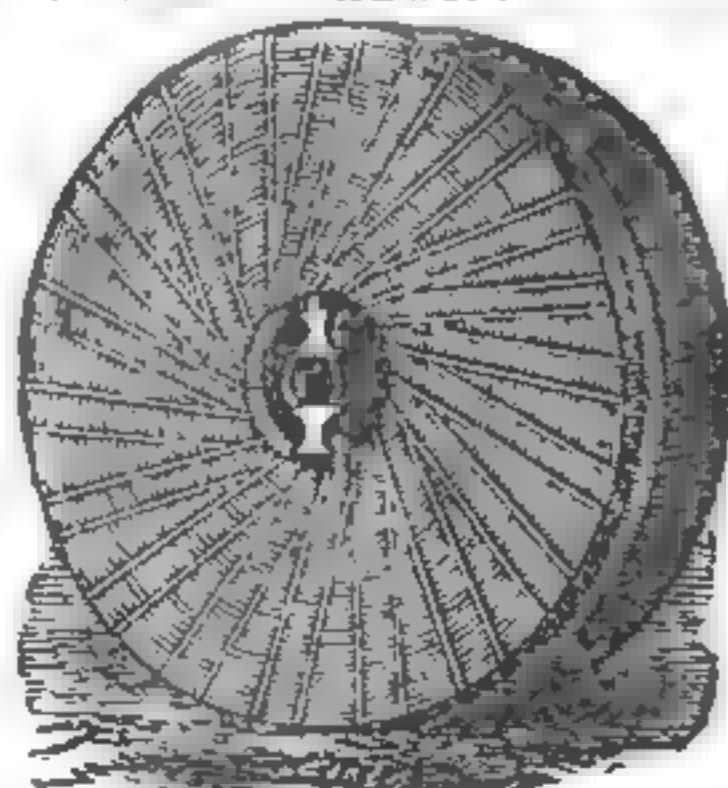
Guaranteed to Run Straight,
Even Throughout,
No Cross Joints,
Unaffected by Damp,
Clings well to the Pulley,
Has No Equal; In Fact,

THE BELT.

MAIN BELTING CO

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J. JAY BELL & CO., Mill Stone Manufacturers,

Also Importers of

FRENCH BURR AND COLOGNE MILL STONES,
Franz Eckert's Genuine Double Anchor Bolting Cloth.

Esopus Mill Stones and Chasers, Mill Irons, Beltings, Mill Picks, Slate and Iron Proof Staffs, Smut Machines, Purifiers, Elevator Cups, and

Mill Furnishing Generally,

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Having been engaged in working the quarries and the manufacture of Esopus Mill Stones, Chasers, &c., for the past thirty years, we are prepared to fill all orders, not only at the lowest prices, but also of the best qualities.

GANDY'S PATENT MACHINE BELTING.

ONE ORDER FOR GANDY BELTING.



ADVANTAGES.

Thoroughly Waterproof, and not affected by temperature
Much Cheaper and Stronger than Leather.

Clings well to the Pulleys.

Runs true, and can be made any length without joints.

These Belts are made for ANY WIDTH of Pulley for MAIN DRIVING, and one end can be TAPERED, if requisite, TO PREVENT JUMP in running. Manufactured of the BEST AMERICAN COTTON DUCK, SPECIALLY HARD WOVEN FOR THE PURPOSE, and stitched together.

These Belts are kept under STRONG TENSION DURING THE WHOLE PROCESS OF MANUFACTURE BY MACHINERY INVENTED AND PATENTED BY M. GANDY, thus reducing stretch to a minimum.

Samples on application.

The following Tests—by Kirkaldy, of London,—show the relative strength and value compared with Leather.

	Breaking Strain per Square Inch of Section.	Price per Foot.
Best Double Leather 6-in Belting	3572 lbs.	\$1.08
Gandy's 6-in x 8-ply Cotton	6811 lbs.	.60c.

MANUFACTURED BY

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Steel, Zinc, Etc.

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Roofing, Siding, Ceiling,
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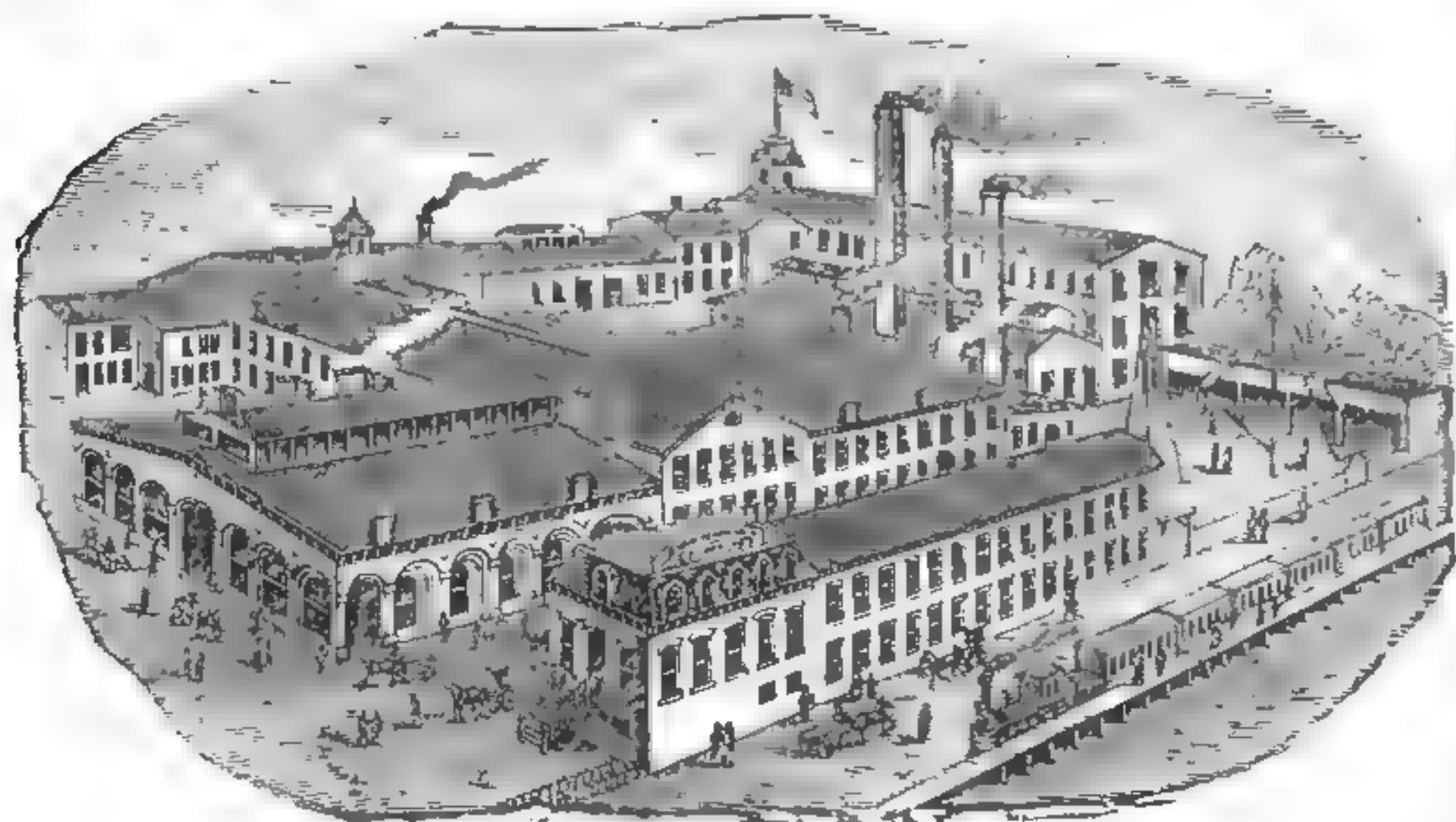
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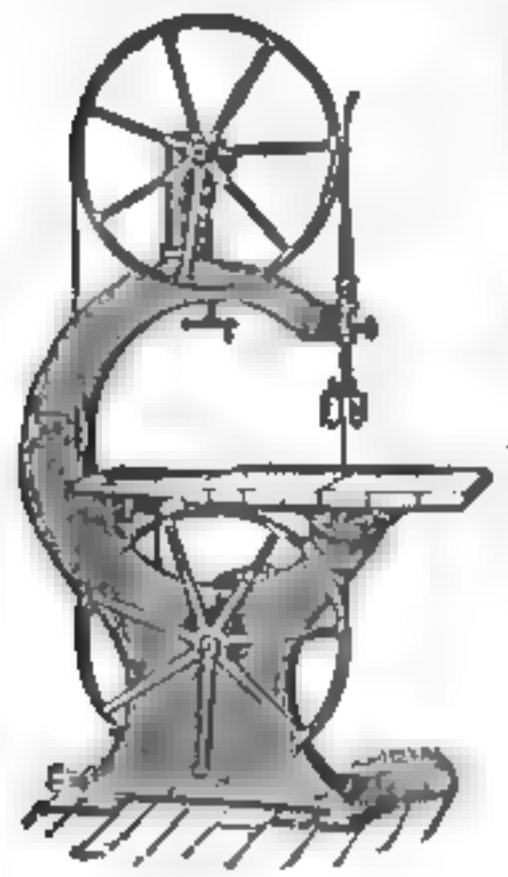
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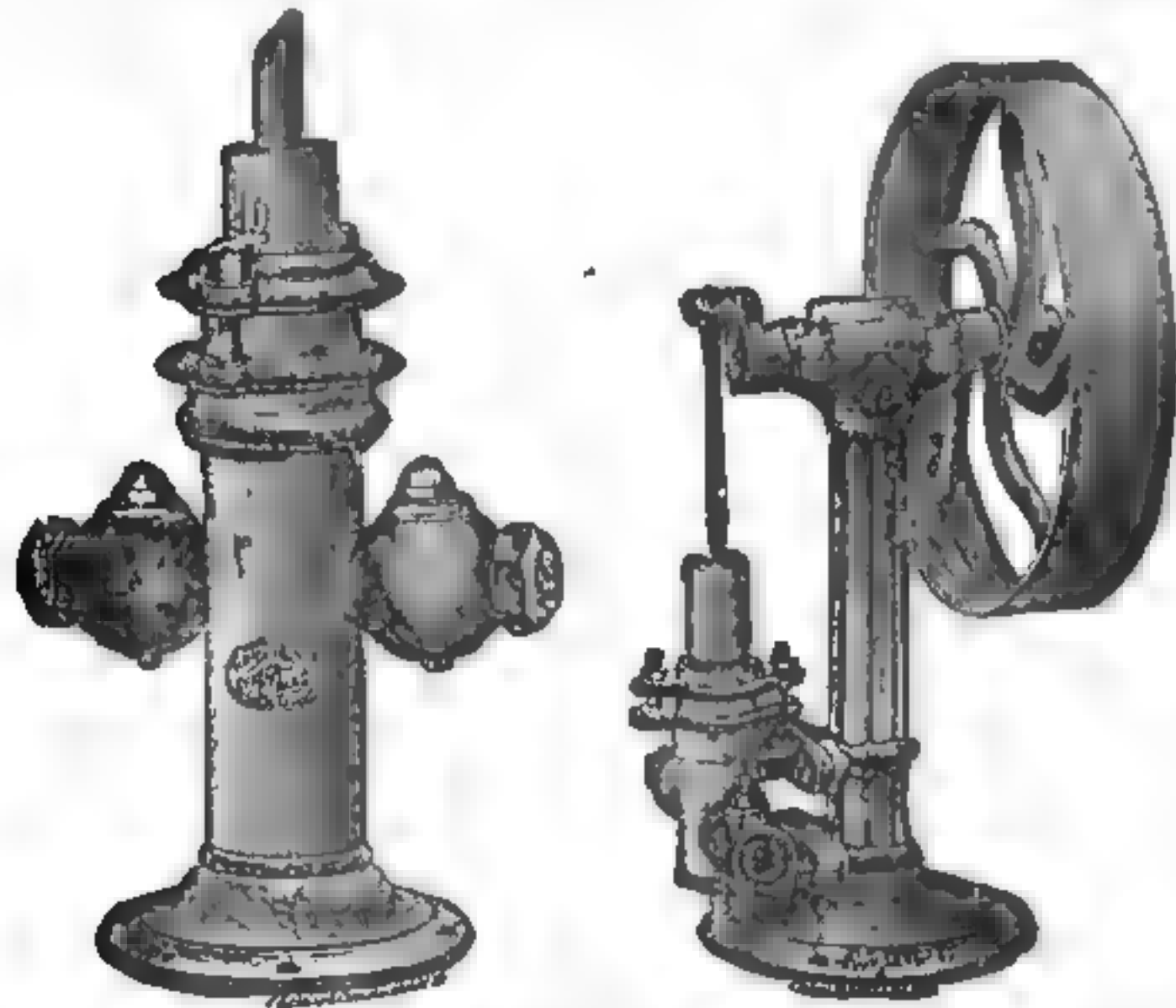
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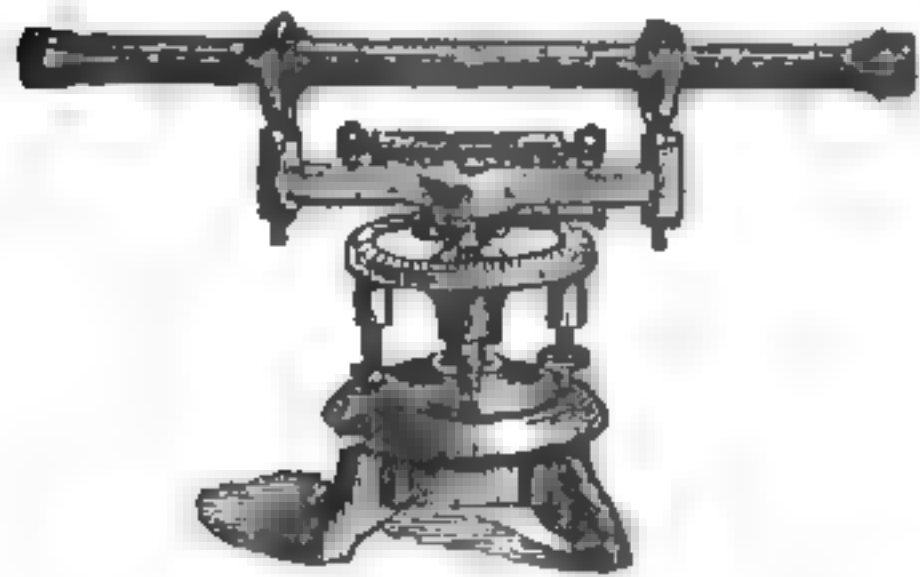
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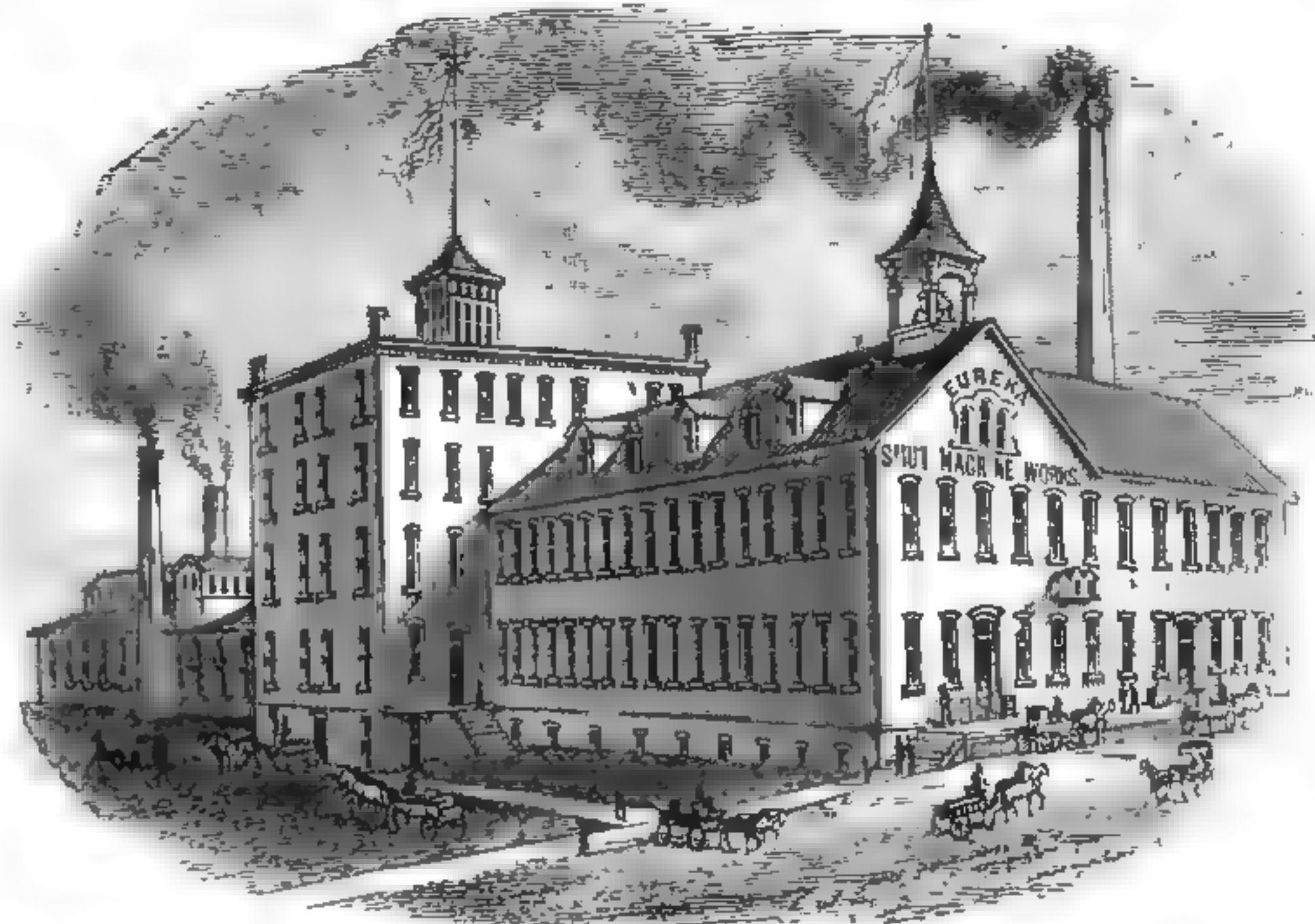
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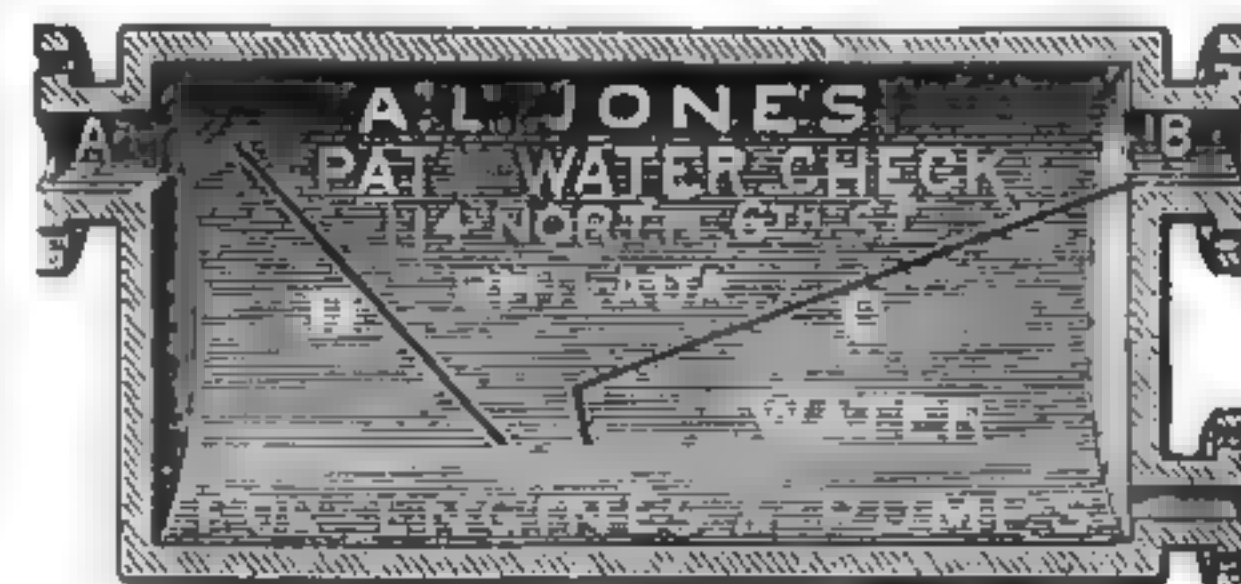
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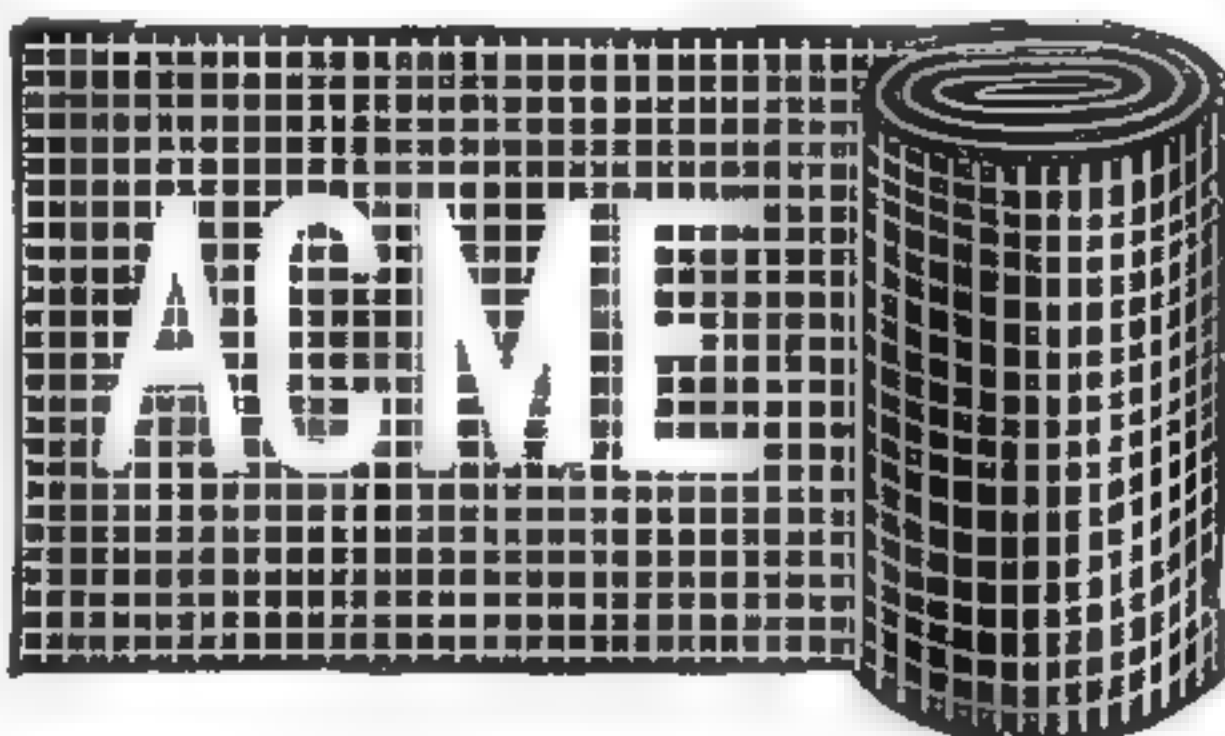
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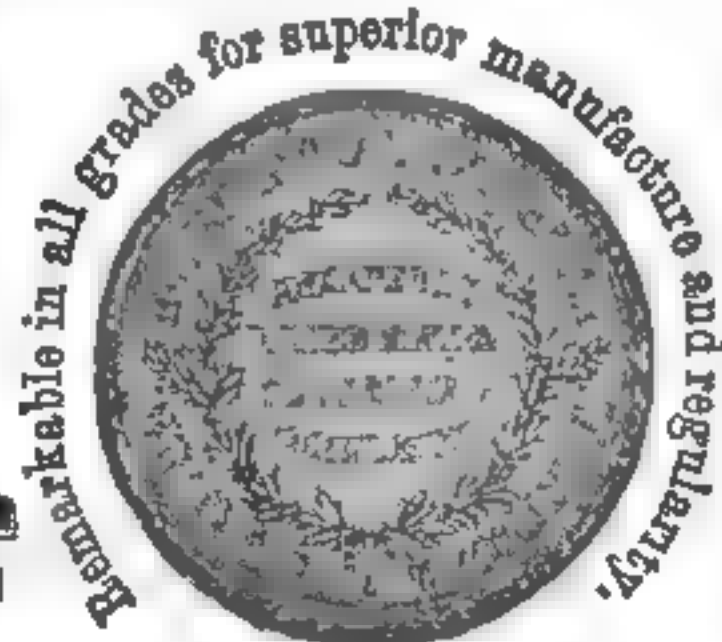


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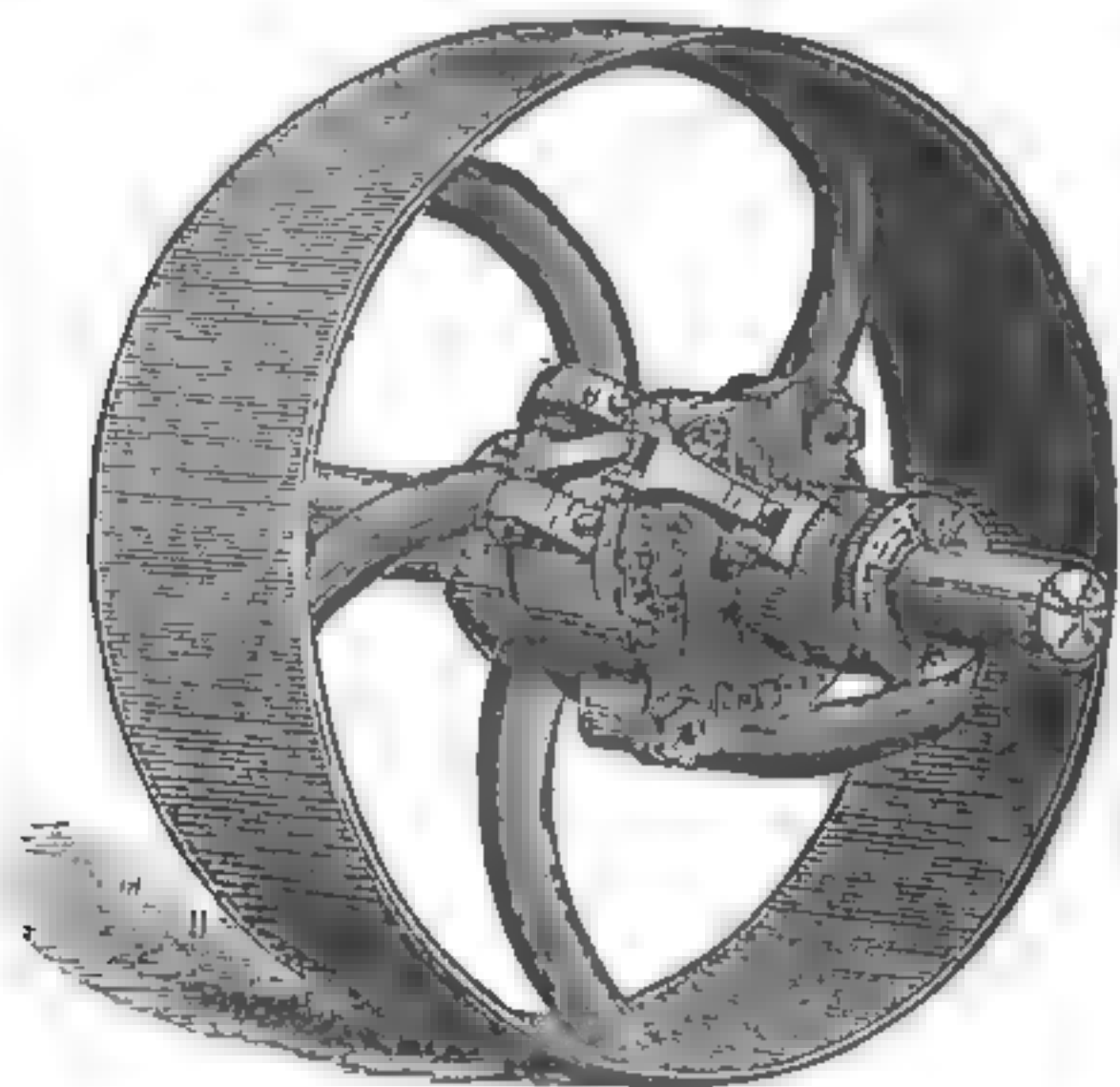
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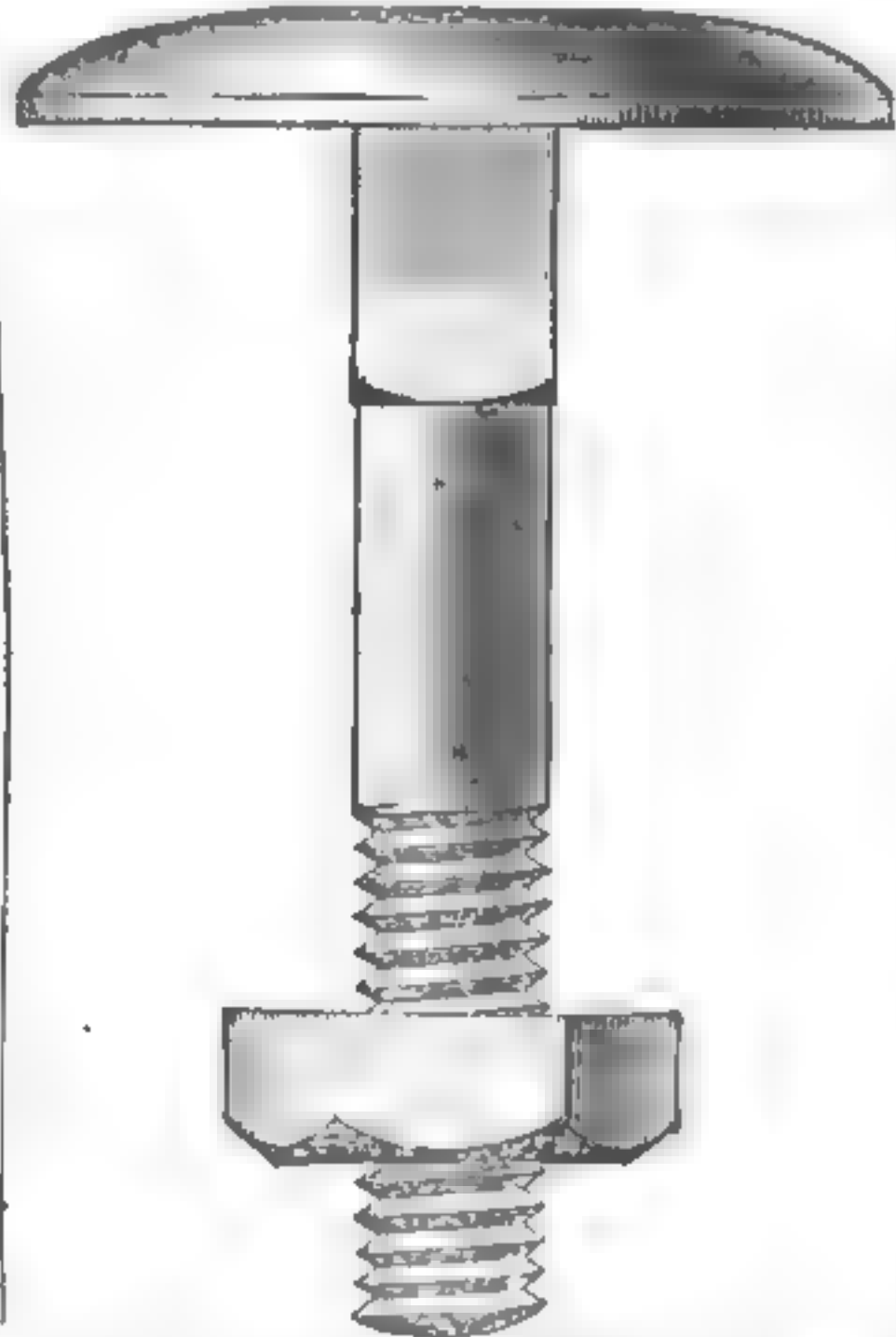
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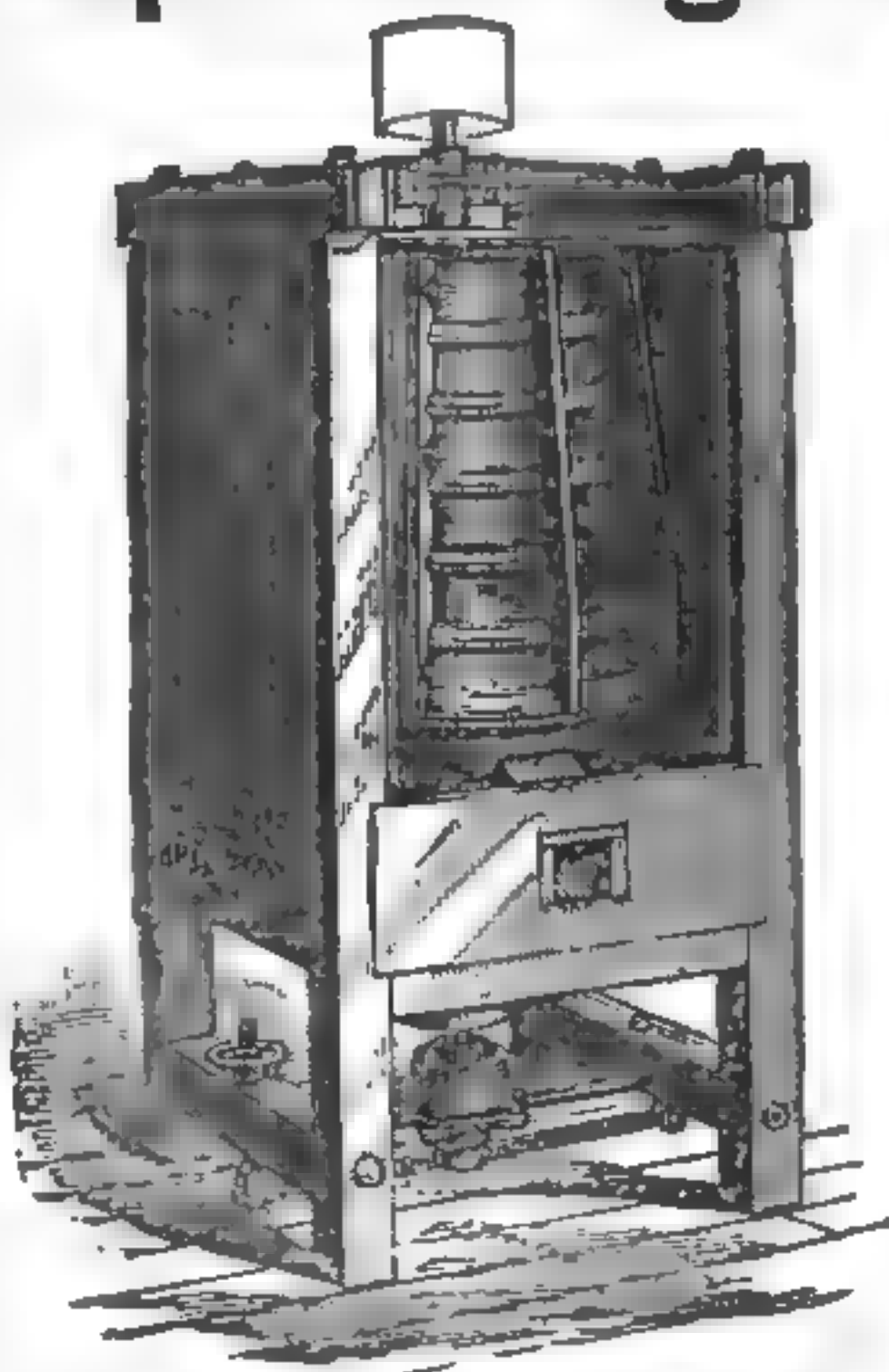
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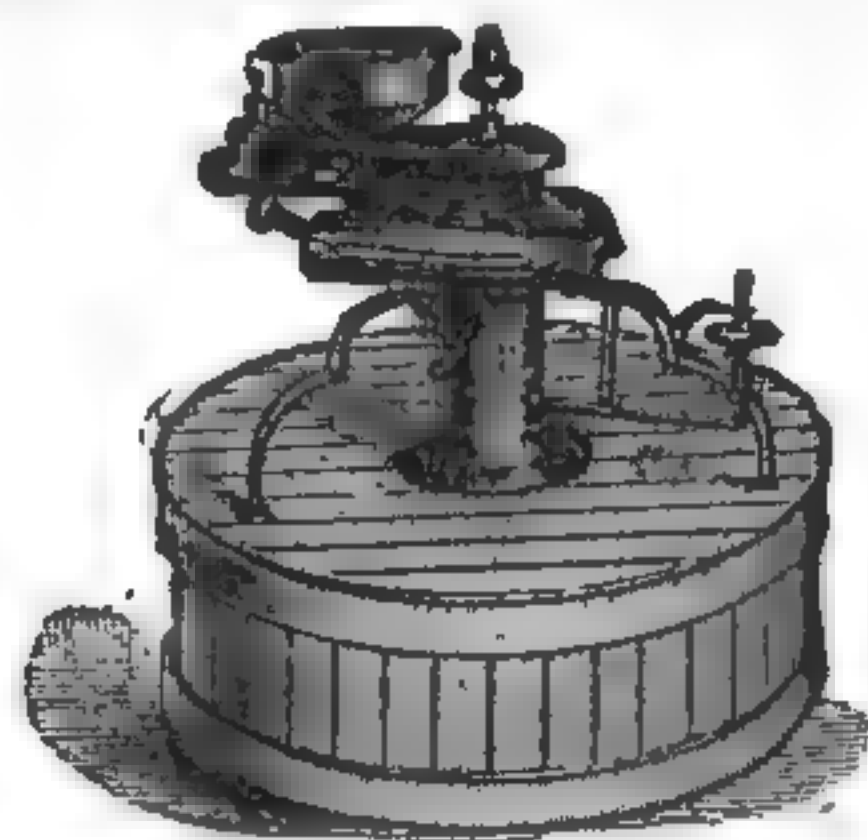
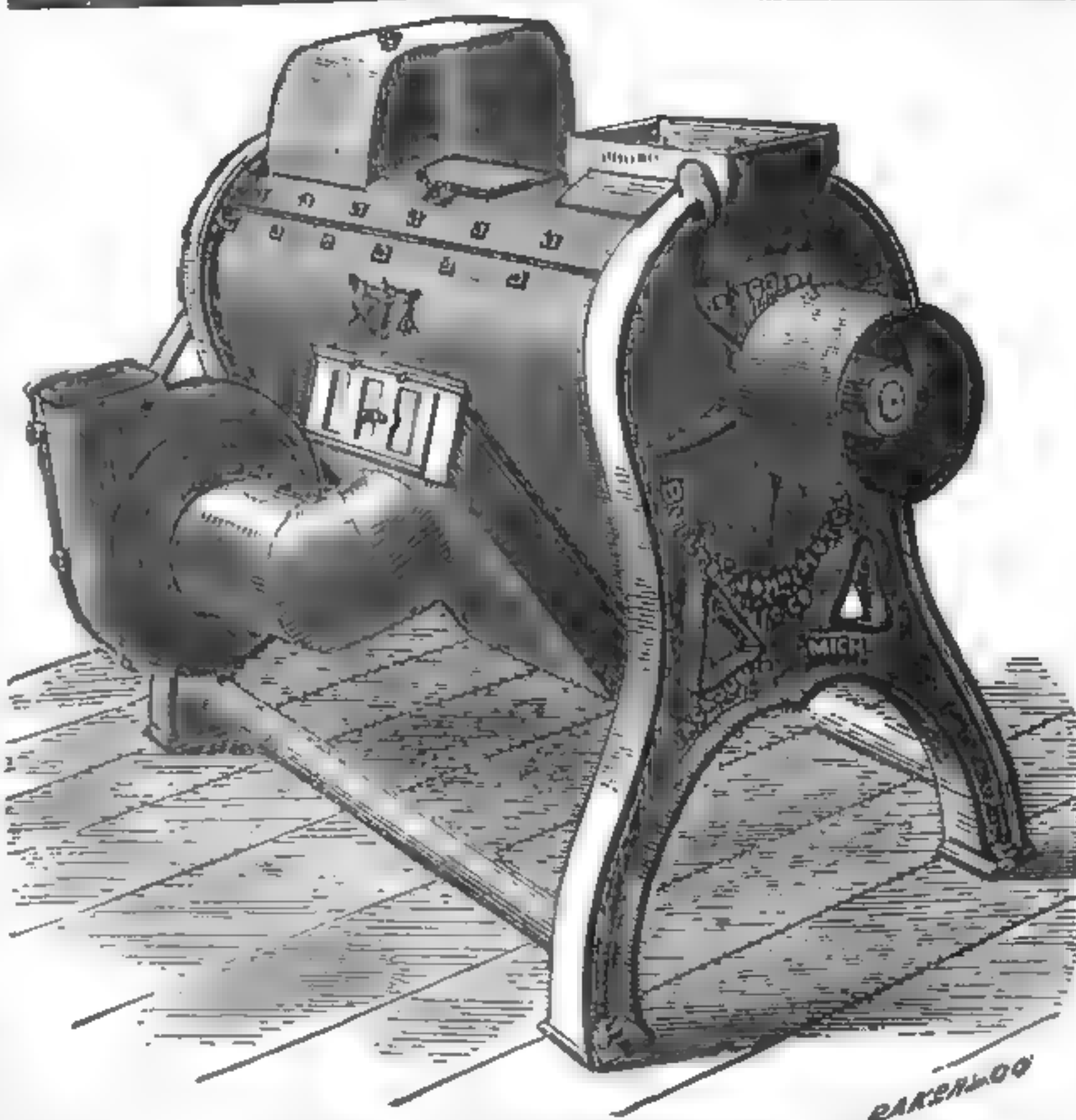
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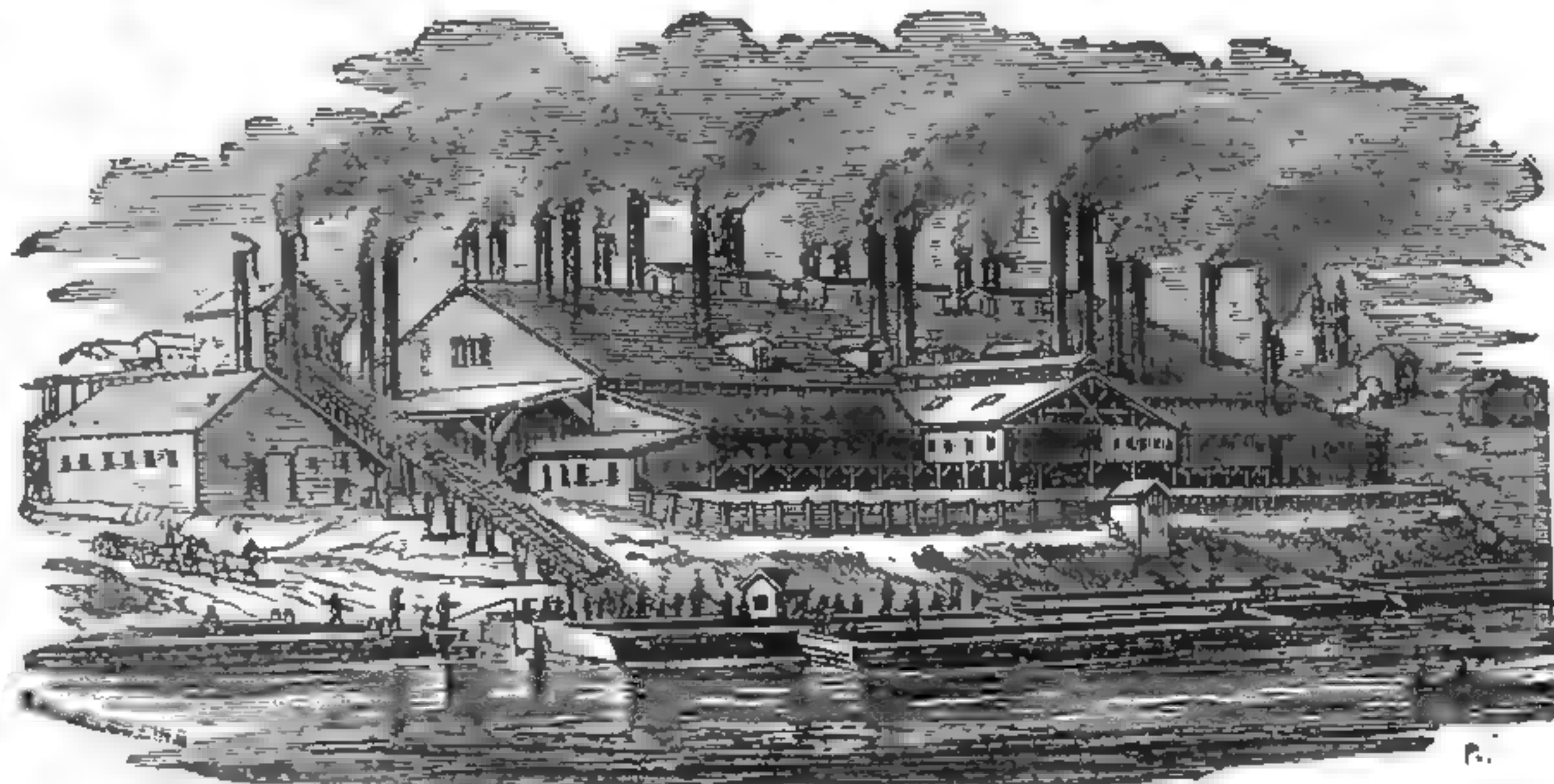
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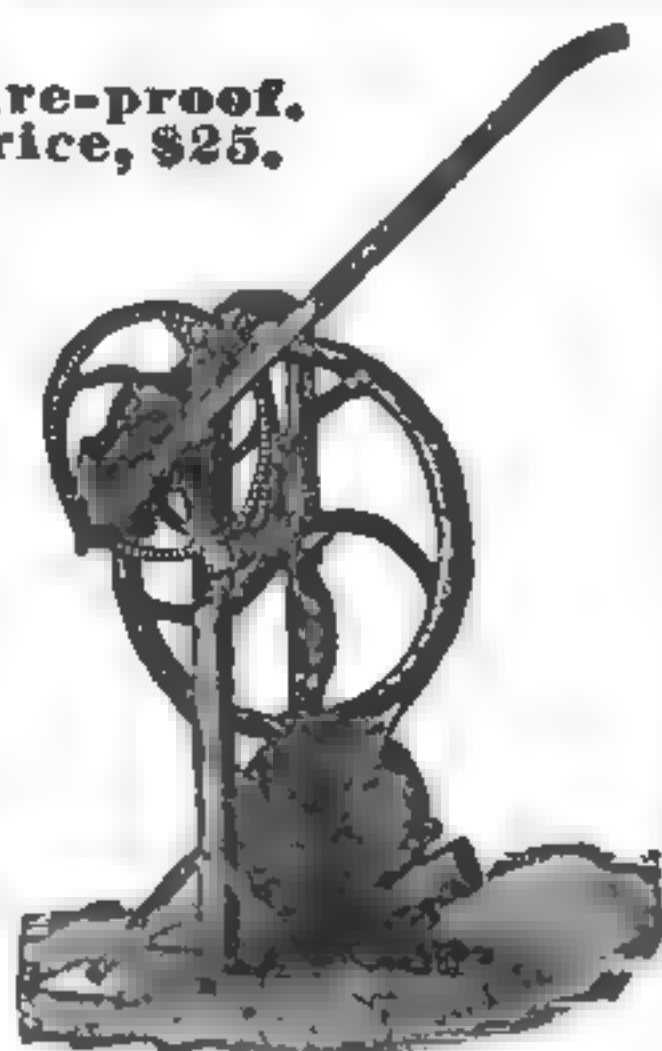
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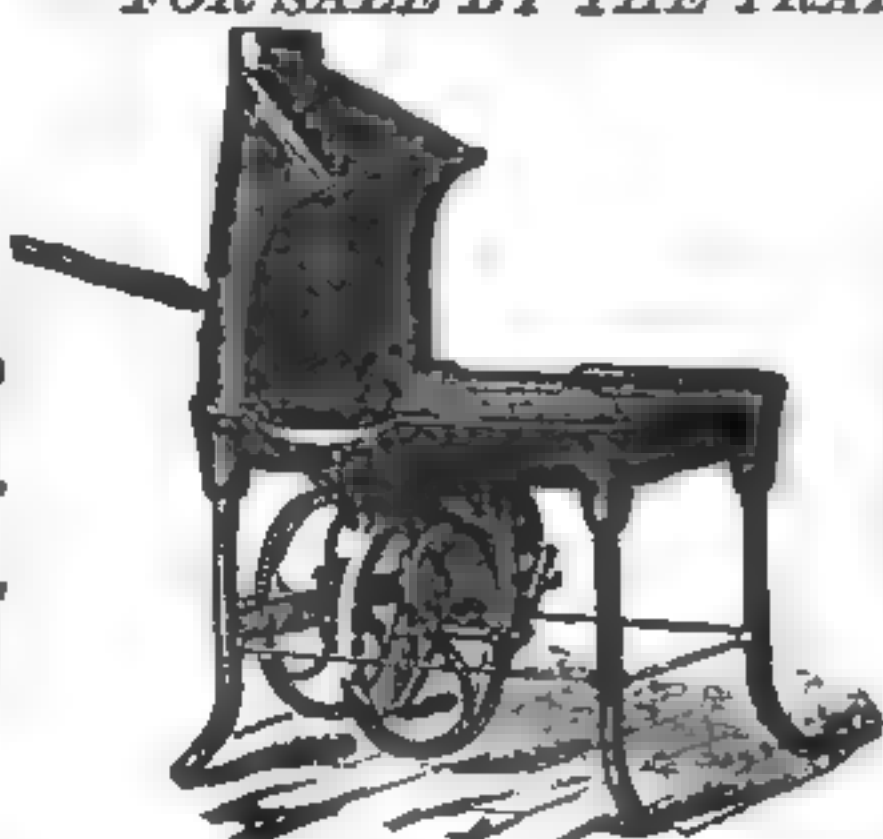
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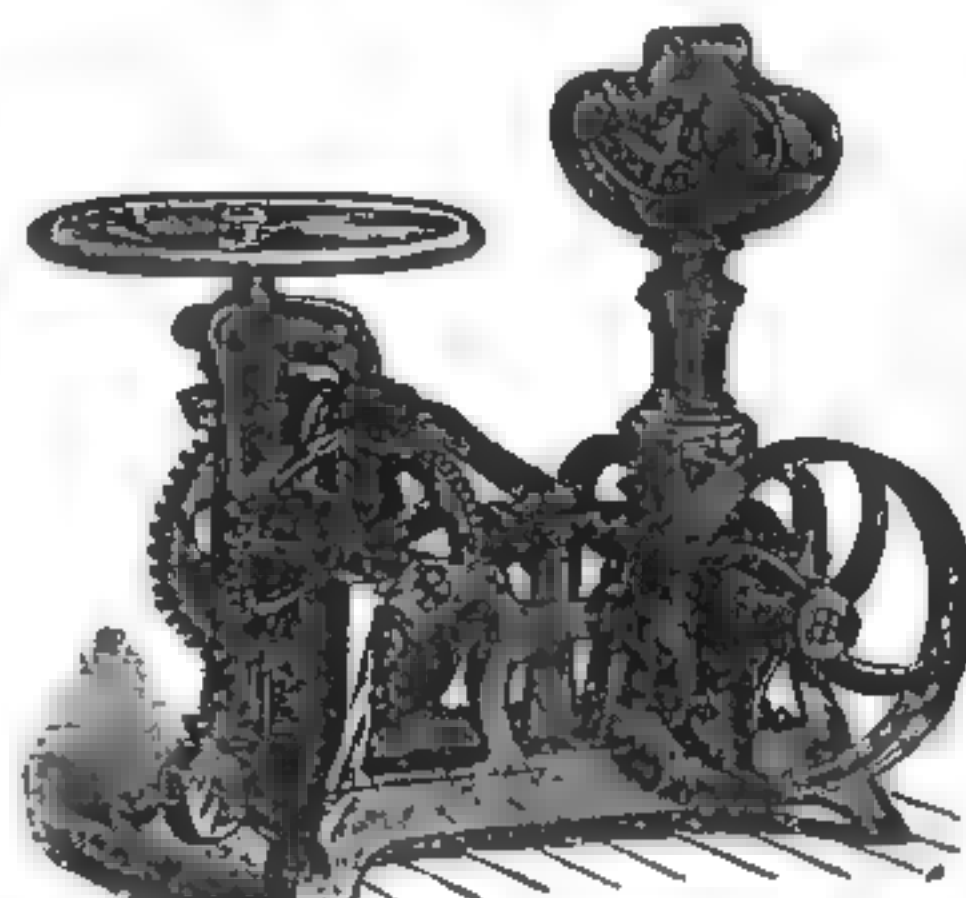
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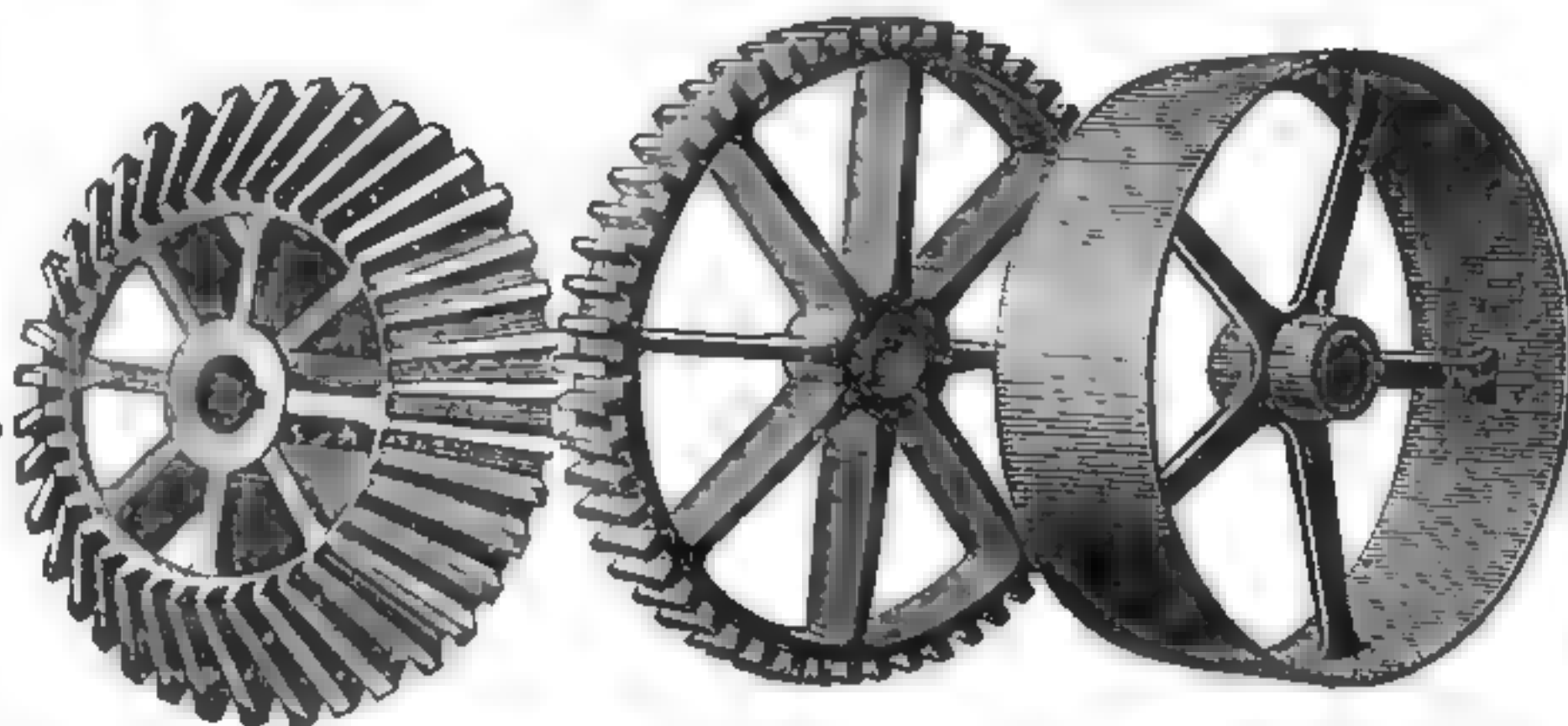
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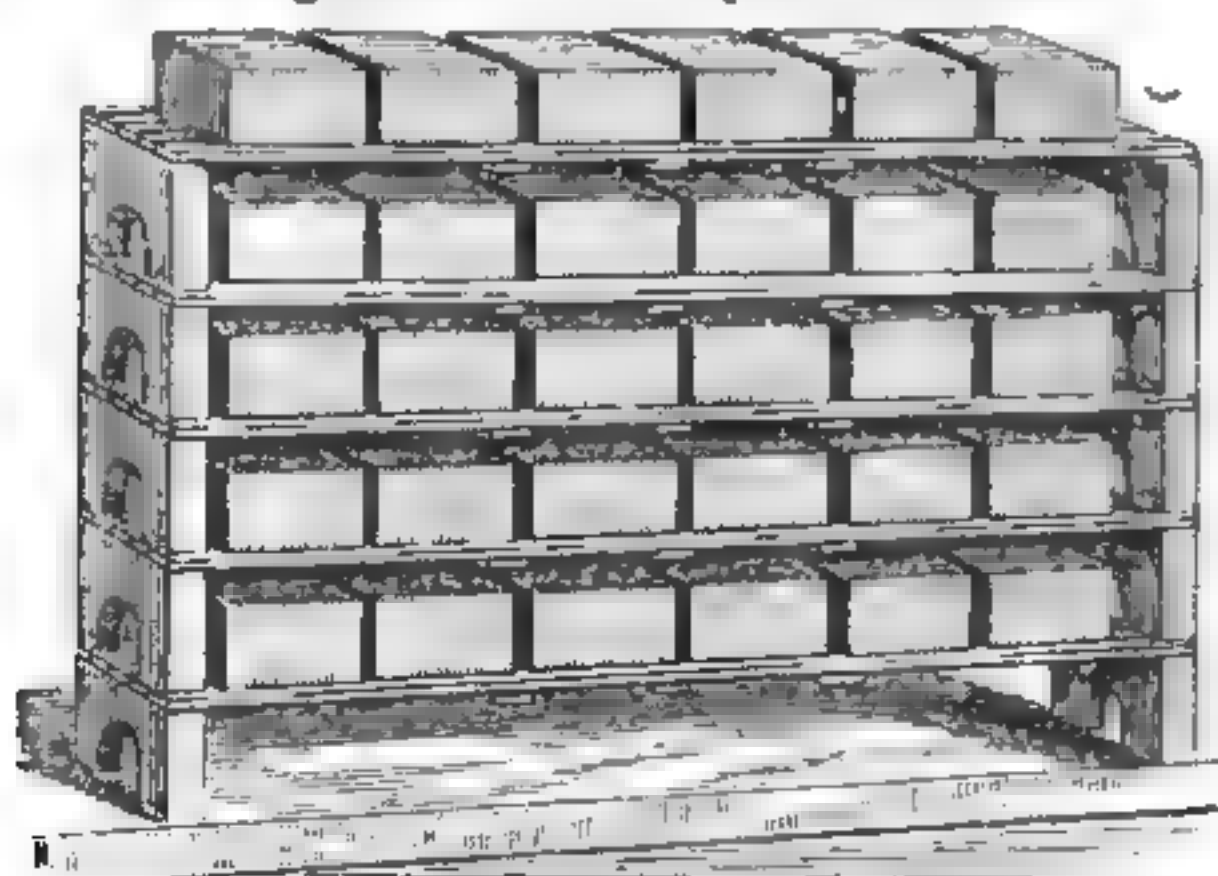
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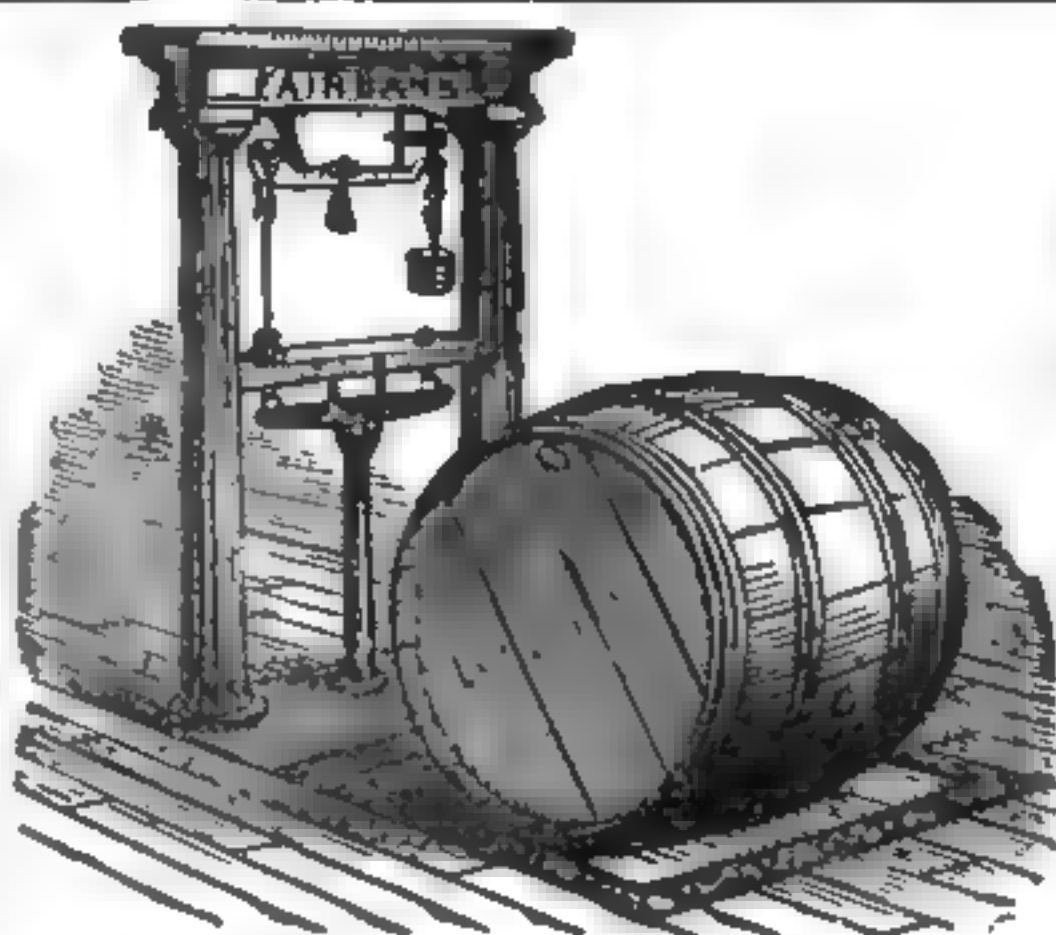


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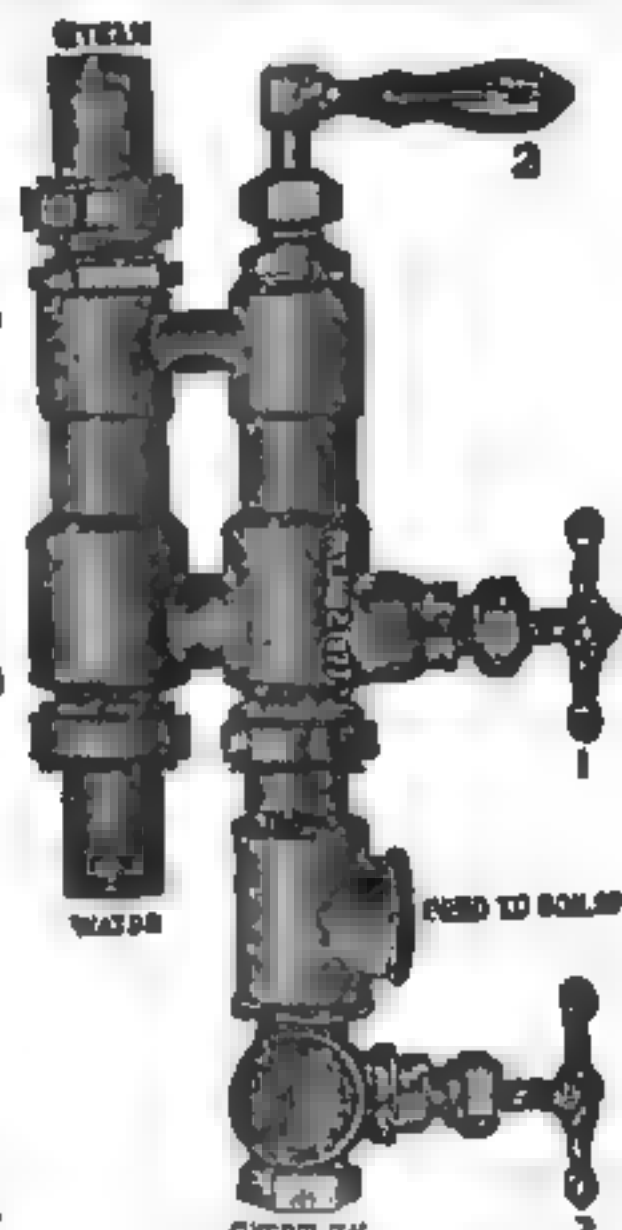
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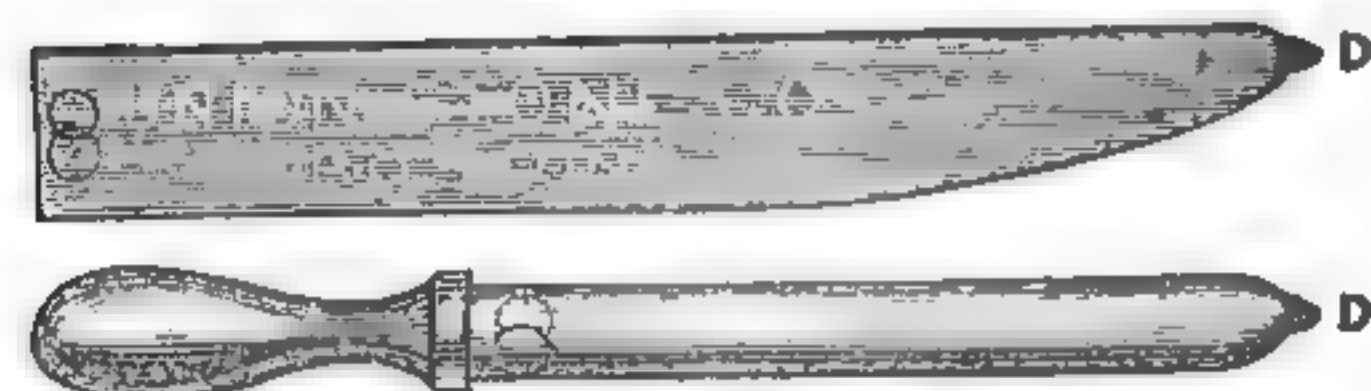
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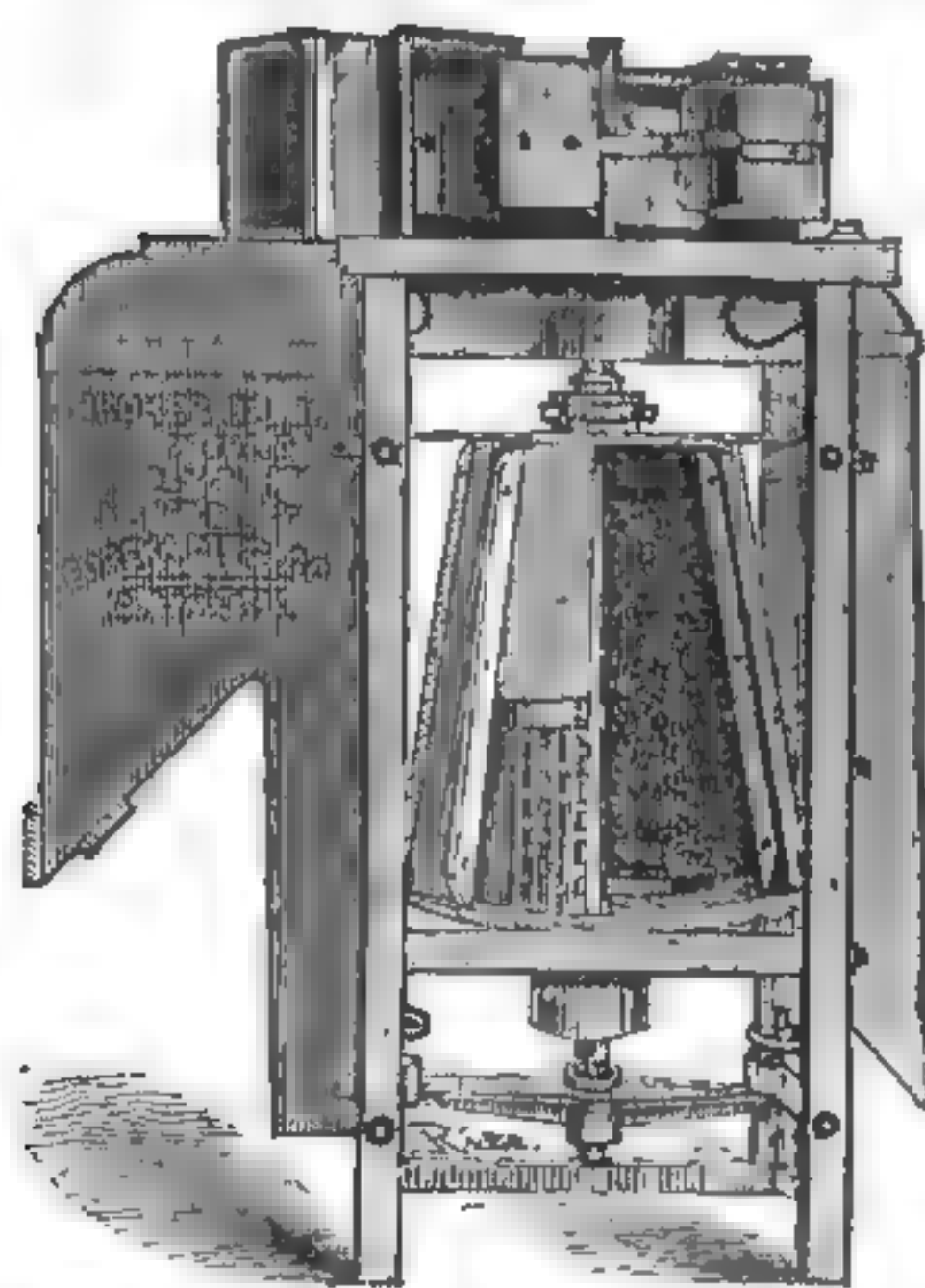
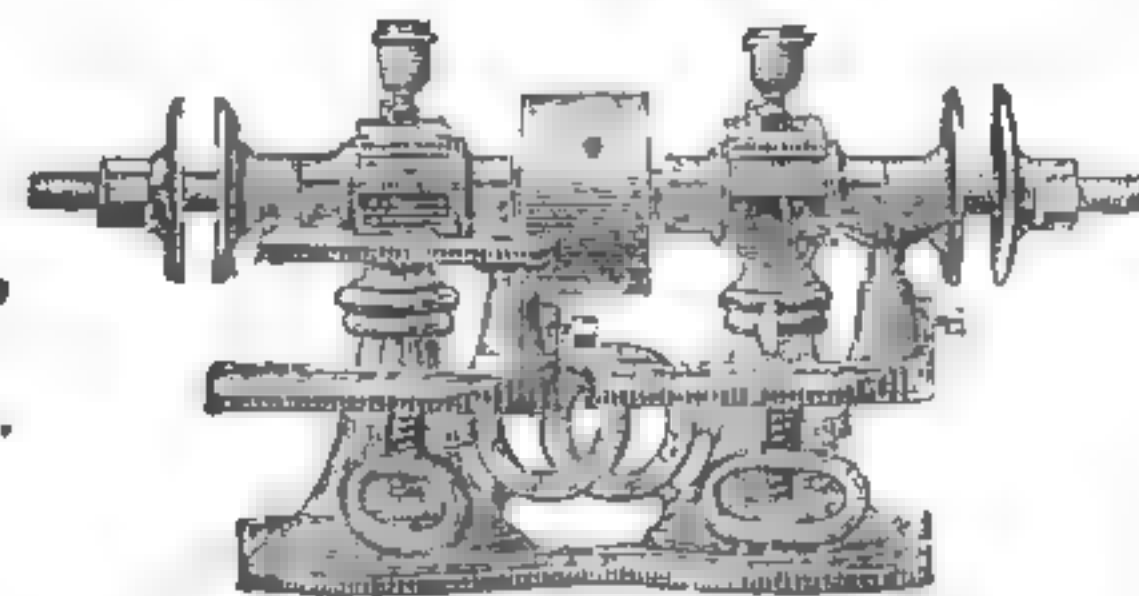
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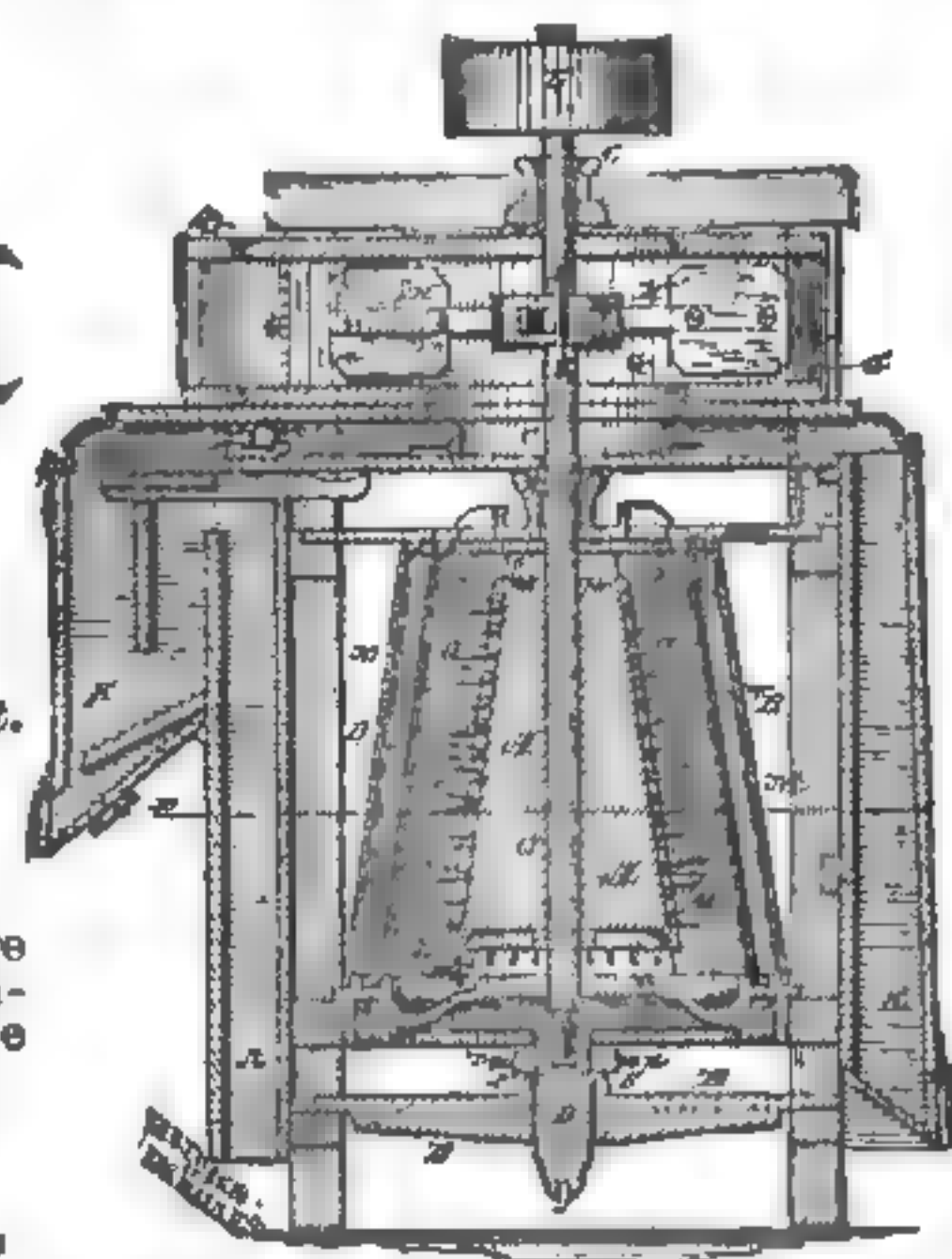
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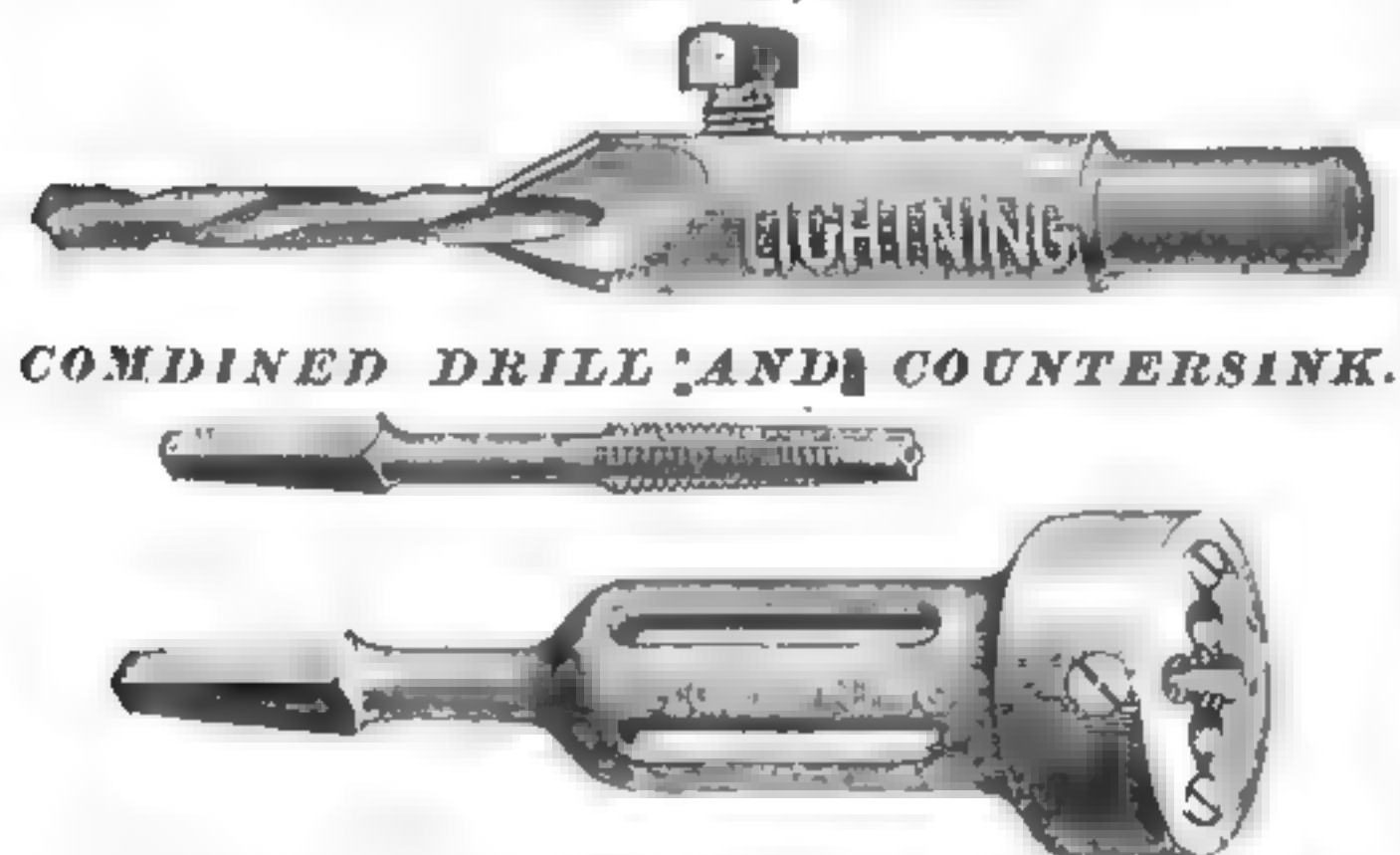
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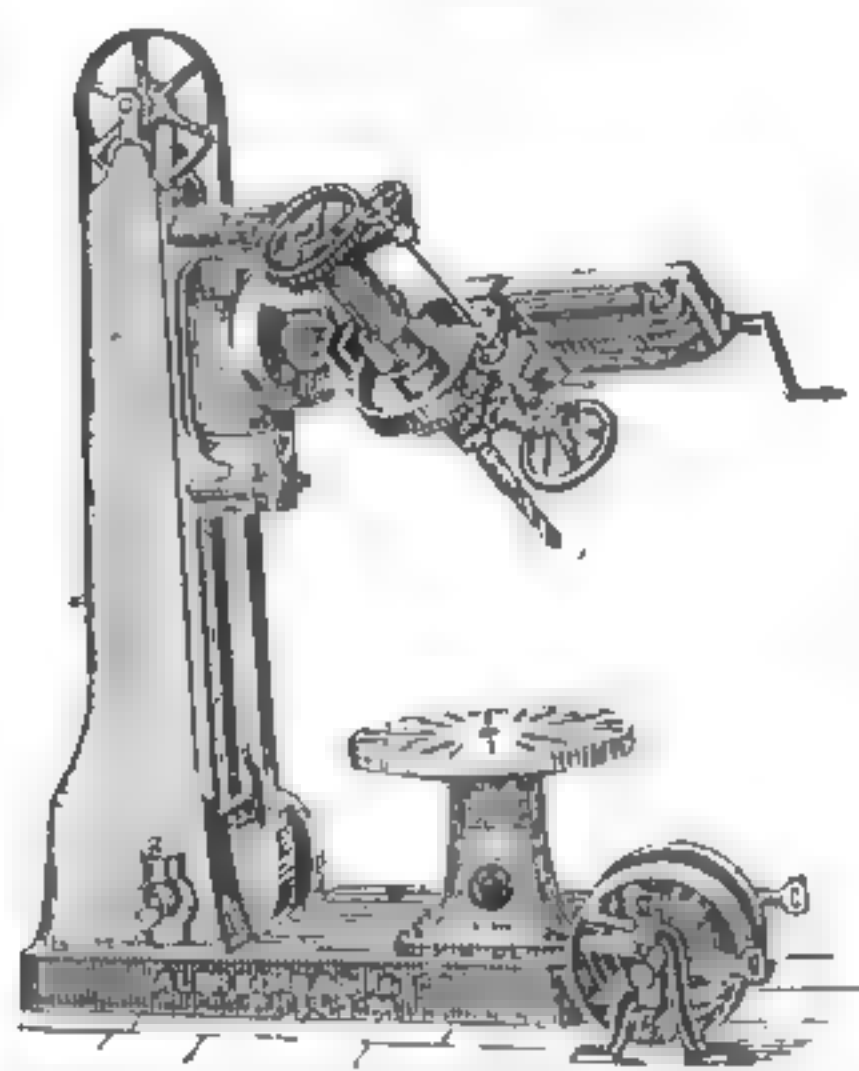
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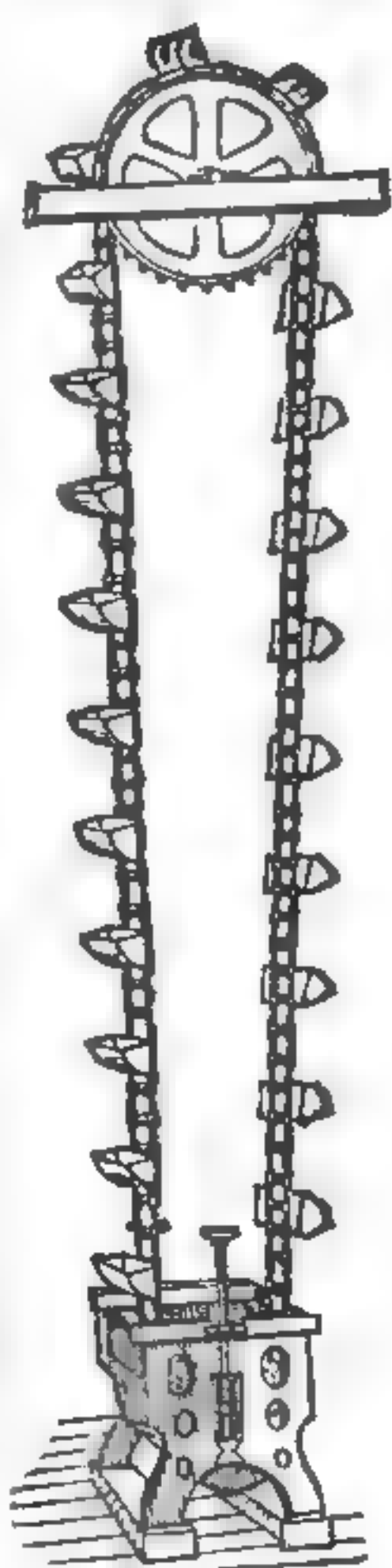
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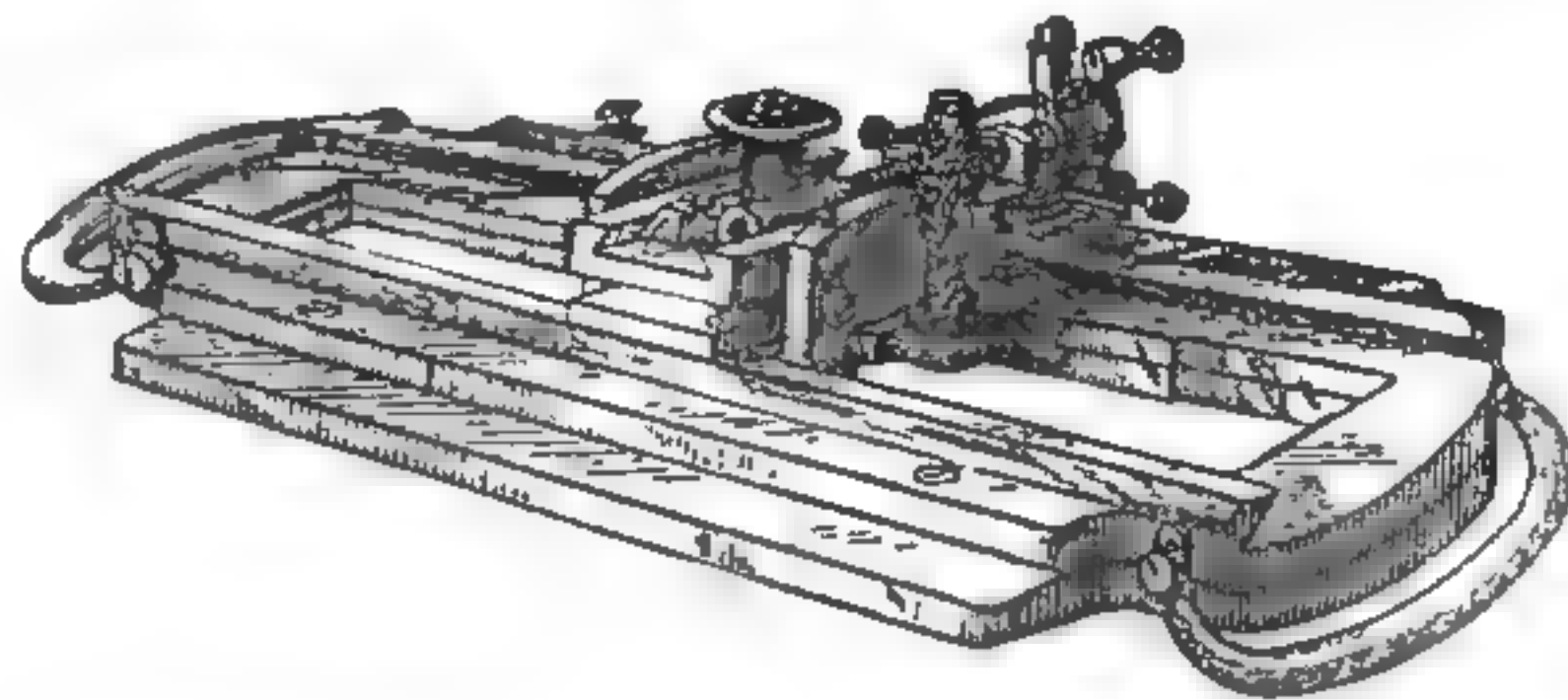
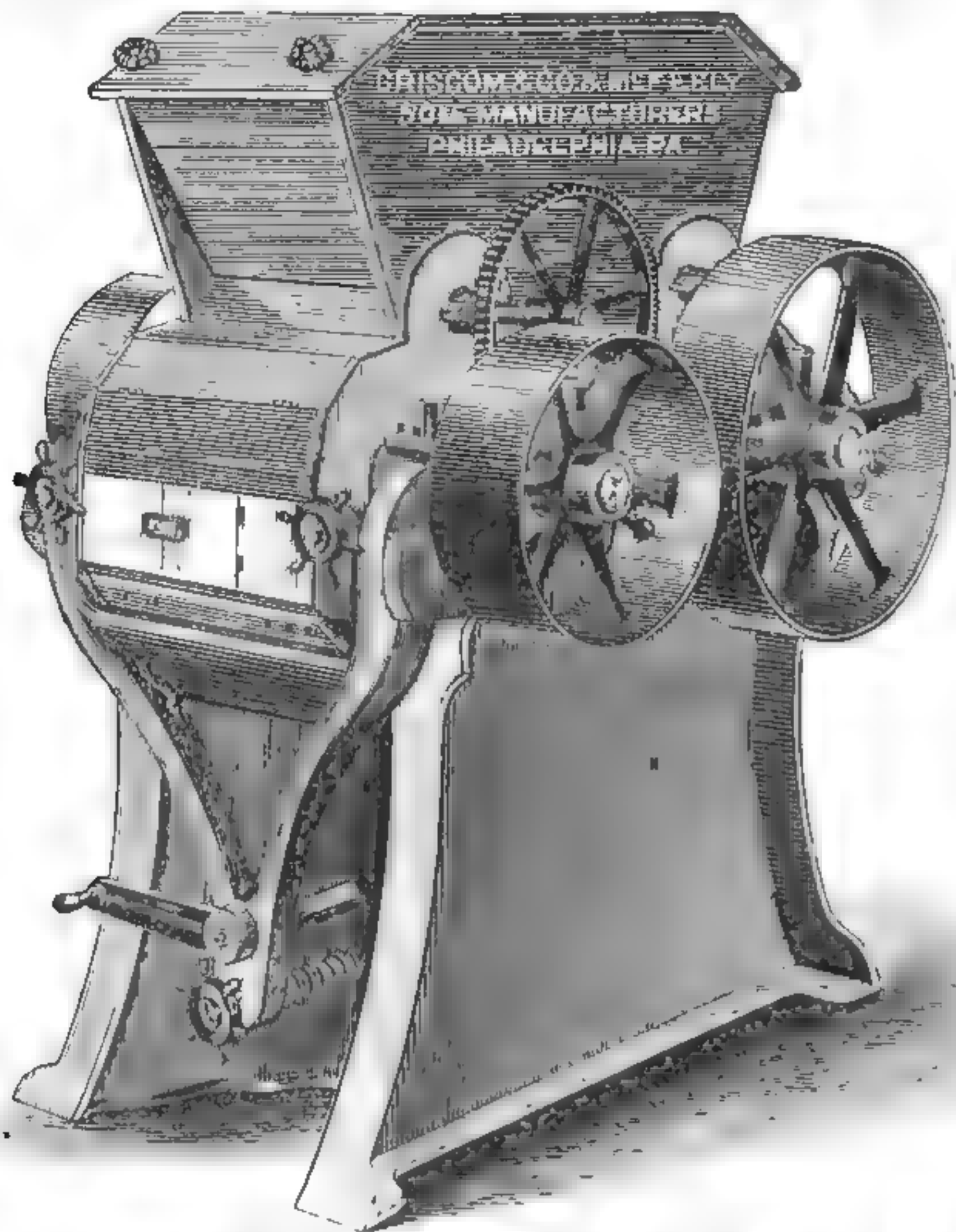
Send for Circular "G," Mentioning this Paper, to the

LECHNER M'F'G. CO.,

COLUMBUS, OHIO.

WHEN WRITING TO ADVERTISERS PLEASE MENTION "THE MILLSTONE."

BUTLER ROLLER MILLS !



Diamond Millstone Dresser !

C. A. Pillsbury & Co. bought their twelfth and thirteenth Machines in January, 1882, for their new roller mill "A."

The manufacturers of no other Stone Dressing Machine can show a single instance where a firm has used several of their machines constantly for three or four years and then bought more of them. We can show HUNDREDS !

McFEELEY ROLLS AND SCALPERS !

Only Rolls made in which Rolls are adjusted with one hand-wheel and one spring, and in which it is IMPOSSIBLE for Rolls to get out of parallel or BEARINGS OUT OF LINE. *Make more coarse, sharp Middlings than any other Rolls.* It will pay you to examine them before buying Rolls.

GRISCOM & CO. & McFEELEY, Sole Manufacturers,
110 S. Fourth St., Philadelphia, Penn.

REYNOLDS & CO., NEW HAVEN, CONN.,

MANUFACTURERS OF

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SCREWS

Of Iron, Steel or Brass.

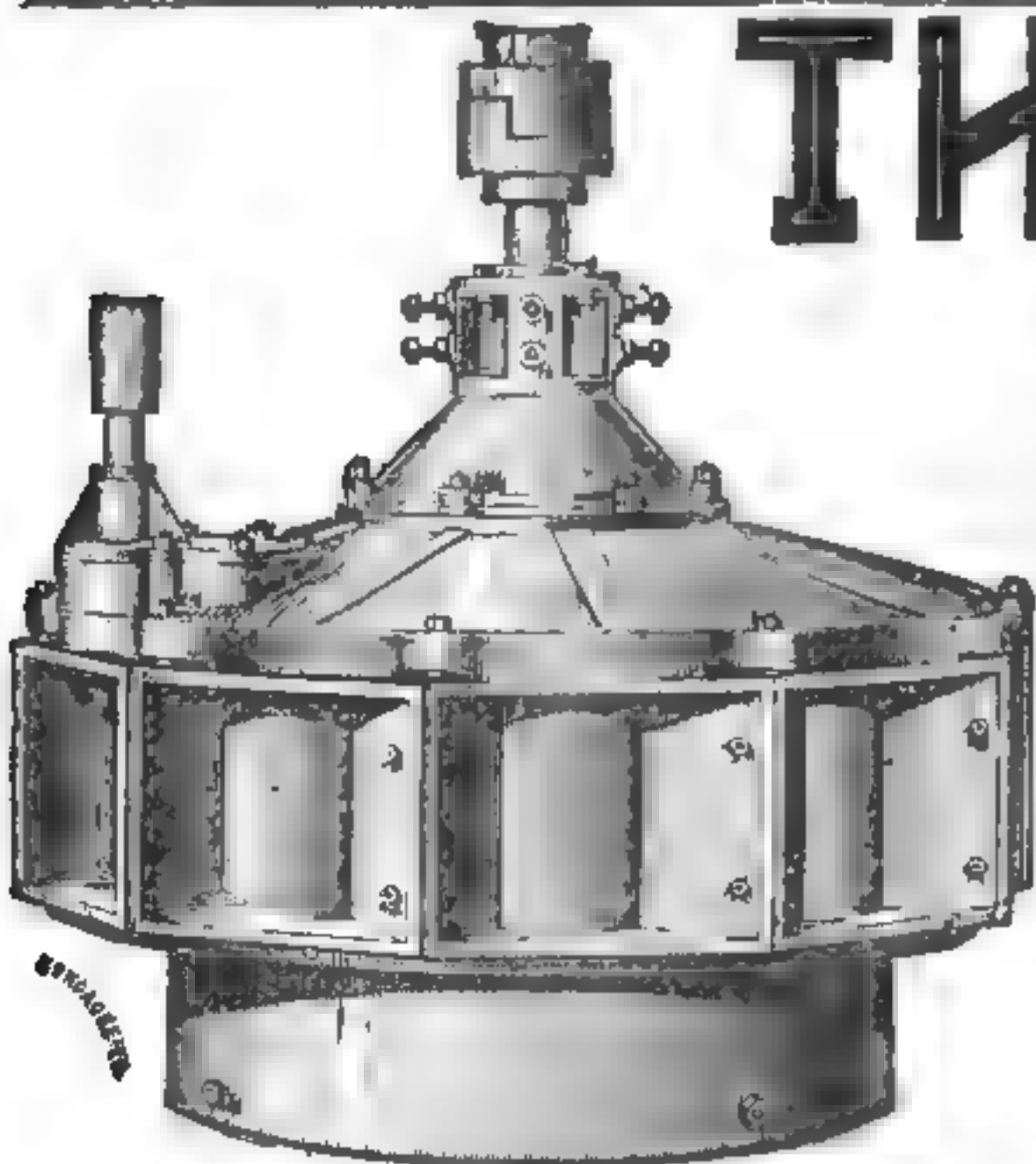
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Machine Screws and Stove Bolts.

A full line kept in stock. Send for circulars.

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247 Lake Street, Chicago, Ill.

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42 Dey Street, New York.



THE EUREKA TURBINE.

CELEBRATED AS THE BEST PART-GATE WHEEL EVER BUILT,
Absolutely Unequaled in Efficiency, as Shown by the
Accompanying Table.

WE PUBLISH OUR PART-GATE FIGURES.
OTHERS SIGNIFICANTLY OMIT THEM.

No other Turbine Ever Approached the Above Percentages at Part-Gate. For Catalogue and Information Address,

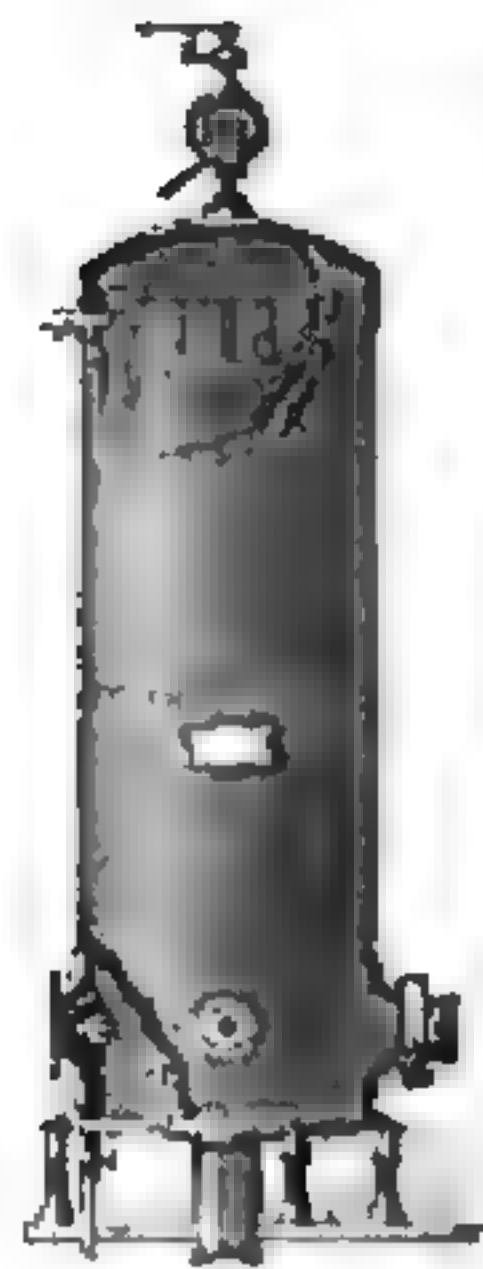
W. H. BARBER & CO., ENGINEERS AND MACHINISTS, Allentown, Pa., U. S. A.

From the Records of Actual Tests at the Holyoke, Mass.,
Testing Flume: PERCENTAGE OF EFFICIENCY.

	Full Gate. $\frac{3}{4}$ Wat'r.	$\frac{1}{2}$ Wat'r.	$\frac{1}{4}$ Wat'r.	$\frac{1}{8}$ Wat'r.
24-inch Wheel.....	.8436	.8416	.8202	.8002
24-inch Wheel.....	.8208	.7910	.7700	.7003
24-inch Wheel.....	.8078	.7578	.7275	.6796
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THE BARAGWANATH STEAM JACKET Feed Water Heater —AND— PURIFIER.

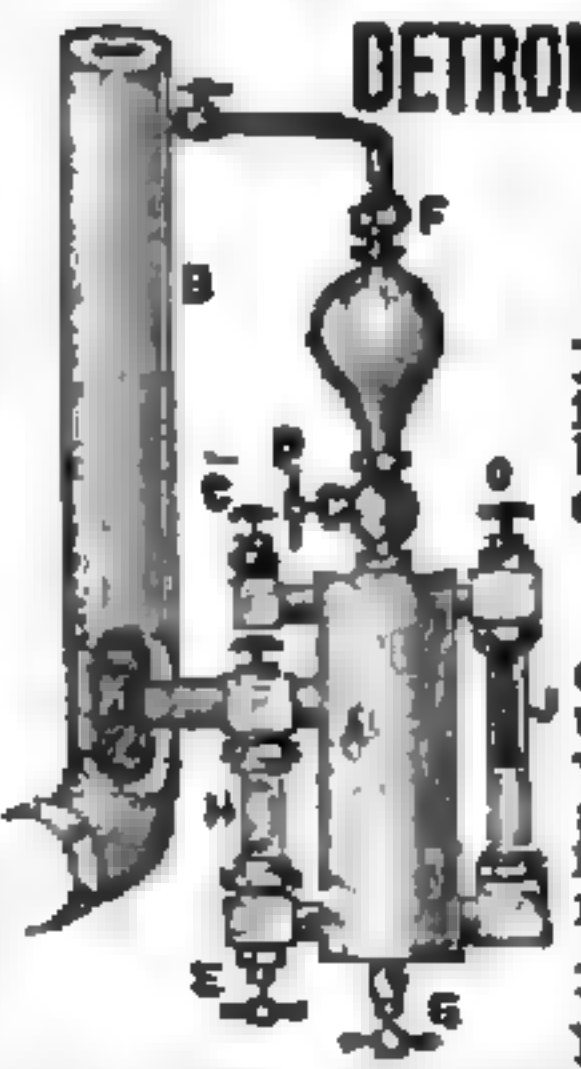
**Delivers Feed Water several Degrees above
Boiling Point, and Reduces Back
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**It Removes Scale and In-
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Boilers,
SAVES FUEL,
Increases the Steam-
ing Capacity of
Boilers,
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PACIFIC BOILER WORKS,
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DETROIT LUBRICATOR CO.'S SIGHT FEED Lubricator Cups,

For oiling valves and cyl-
inders of steam engines, by the only perfect meth-
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Through the Steam Pipe.
The oil passes IN SIGHT
drop by drop into the col-
umn of steam, where it
vaporizes, thus becoming
a STEAM LUBRICANT, oil-
ing perfectly every part
reached by the steam.
Any OIL, black or
white, light or heavy, may
be used. Saves from 50 to

90 per cent. in oil and wear of machinery, thus pay-
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NOTICE.—The first Lubricators ever made show-
ing the oil passing DROP BY DROP THROUGH A
TRANSPARENT WATER CHAMBER, were devised by us,
and are fully embraced by many letters patent own-
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in several hotly contested legal contests. Our cus-
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CHASE AND USE. We are the owners of the "SIGHT
FEED" feature as claimed and used by us, and we
shall hold purchasers and users responsible who are
encroaching upon our rights by the unlawful use of
our devices. Address

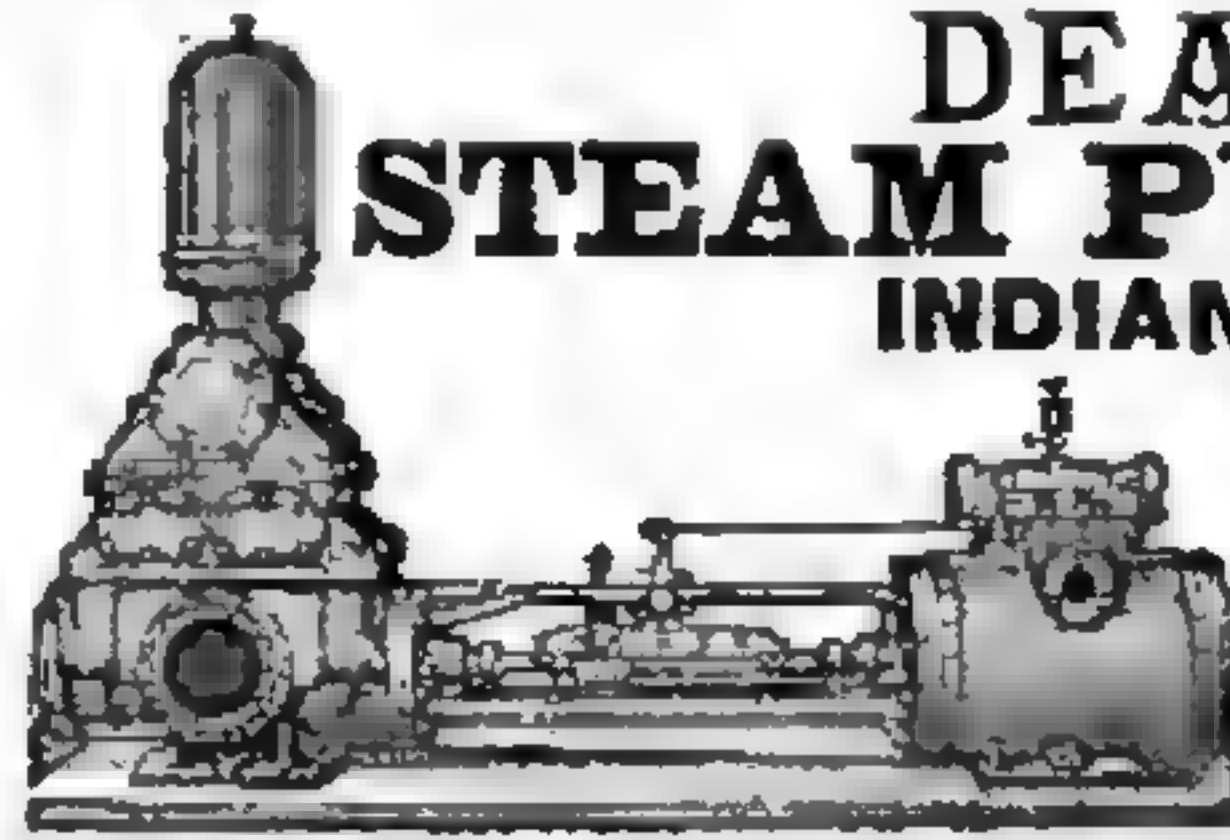
Detroit Lubricator Co., Office, 129 Griswold-st., Detroit, Mich.

NOTE.—In our recent suit against the American
Lubricator Co., of Detroit, before Justice Stanley
Matthews, of the U. S. Supreme Court, involving
their "sight feed" feature, a decree was rendered in
our favor Aug. 20, 1881.

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The only reliable Automatic
Loose Pulley Oiler in the World.
Saves Oil, Bolting, Machinery, Time.
Boiling of Fabrics, etc., etc. Will
run from one to three months with
once filling. Give diameter and
speed of pulley.

Loose Pulley Lubricator Mfg. Co.,
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DEAN BROS' STEAM PUMP WORKS, INDIANAPOLIS, IND.

Boiler Feeders, Fire Pumps,
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& Condensers, Water Works
Pumps.

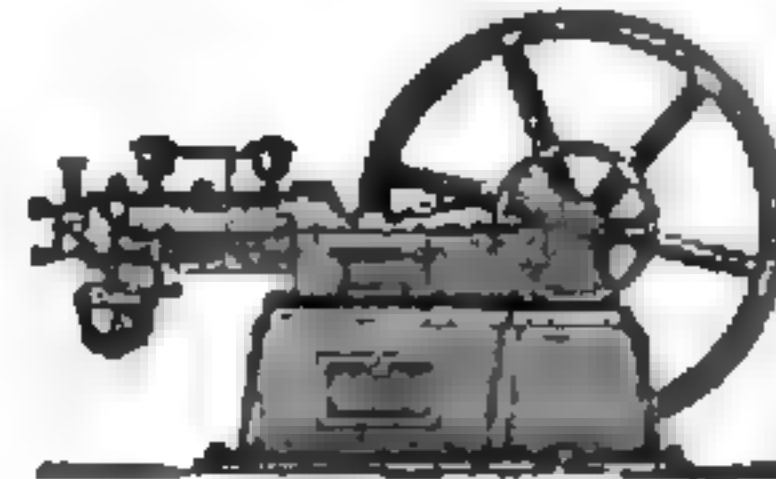
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BEST POWER known for ELEVATORS.

STARTS INSTANTLY.

NO BOILER.

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WHEN STOPPED ALL
EXPENSE CEASES.

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GAS ENGINE.

FROM	TO	Horse Power.	Union Depot Grain Elevator Co., St. Louis, Mo., uses 4 engines, total 80 horse power.	in Use for all purposes	OVER 8,000
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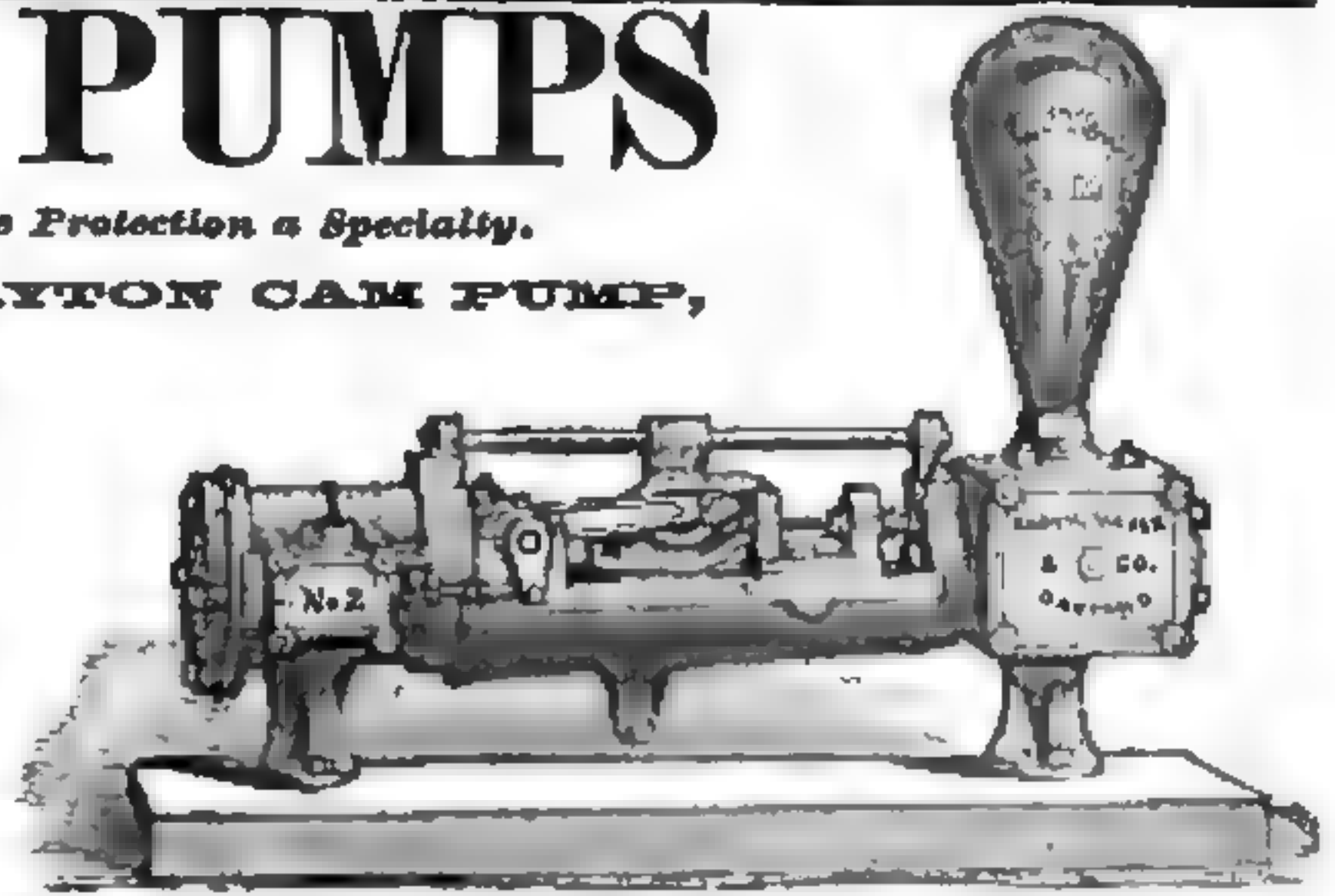
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THE IMPROVED DAYTON CAM PUMP,

Designed and built especially for BOIL-
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WATER. Pumping Returns from Coils
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ratus, without the use of traps or tanks.
The simplest, most economical and dur-
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Most Powerful Fire Pumps
ever made. Every machine warranted.
Over 3,800 in use. All sizes kept in
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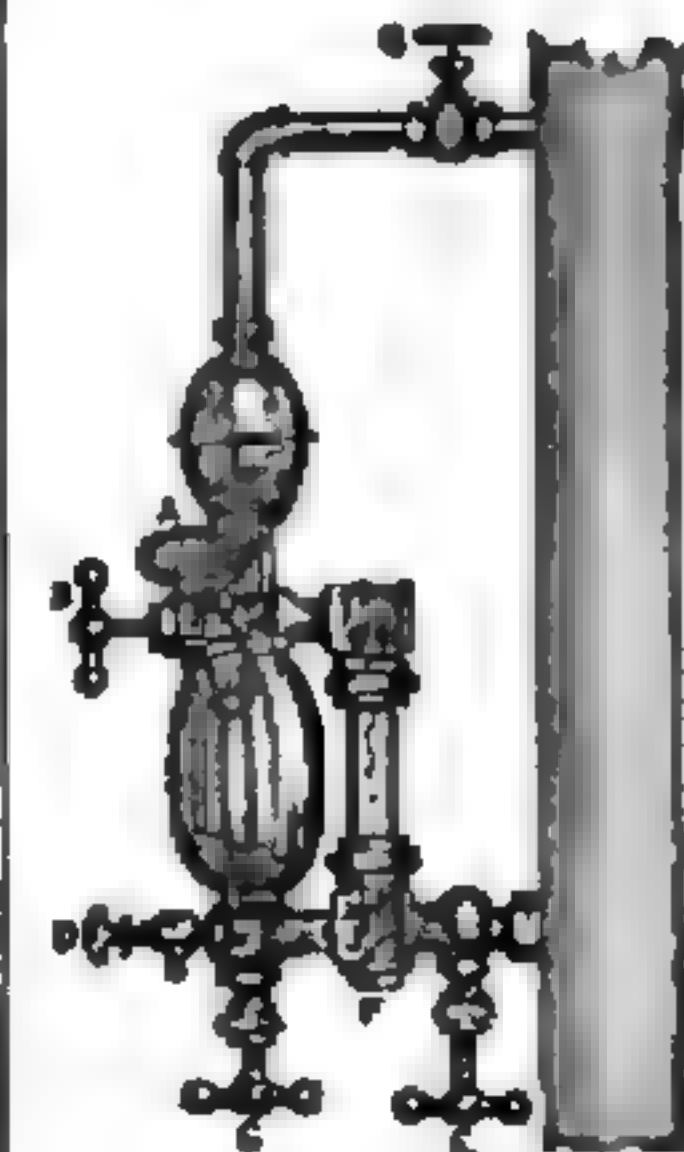


THE HOLLAND LUBRICATOR,

Patented July 5, 1881.

Manufactured by

HOLLAND & THOMPSON,
TROY, N. Y.



For lubricating the Valves and Cylinders of
Engines. This is the only Lubricator operating
with a downward drop. We do not use the trans-
parent water chamber, which so many parties
claim to be the inventors of. A sample will be
sent to any responsible party on 20 days' trial.
We do not effect sales by threats, but depend on
the merits of our Lubricator.

OLINE COMPOUND,

For Lubricating

Engines and Shafting.

Hot Journals and Dripping
of Oil Avoided.

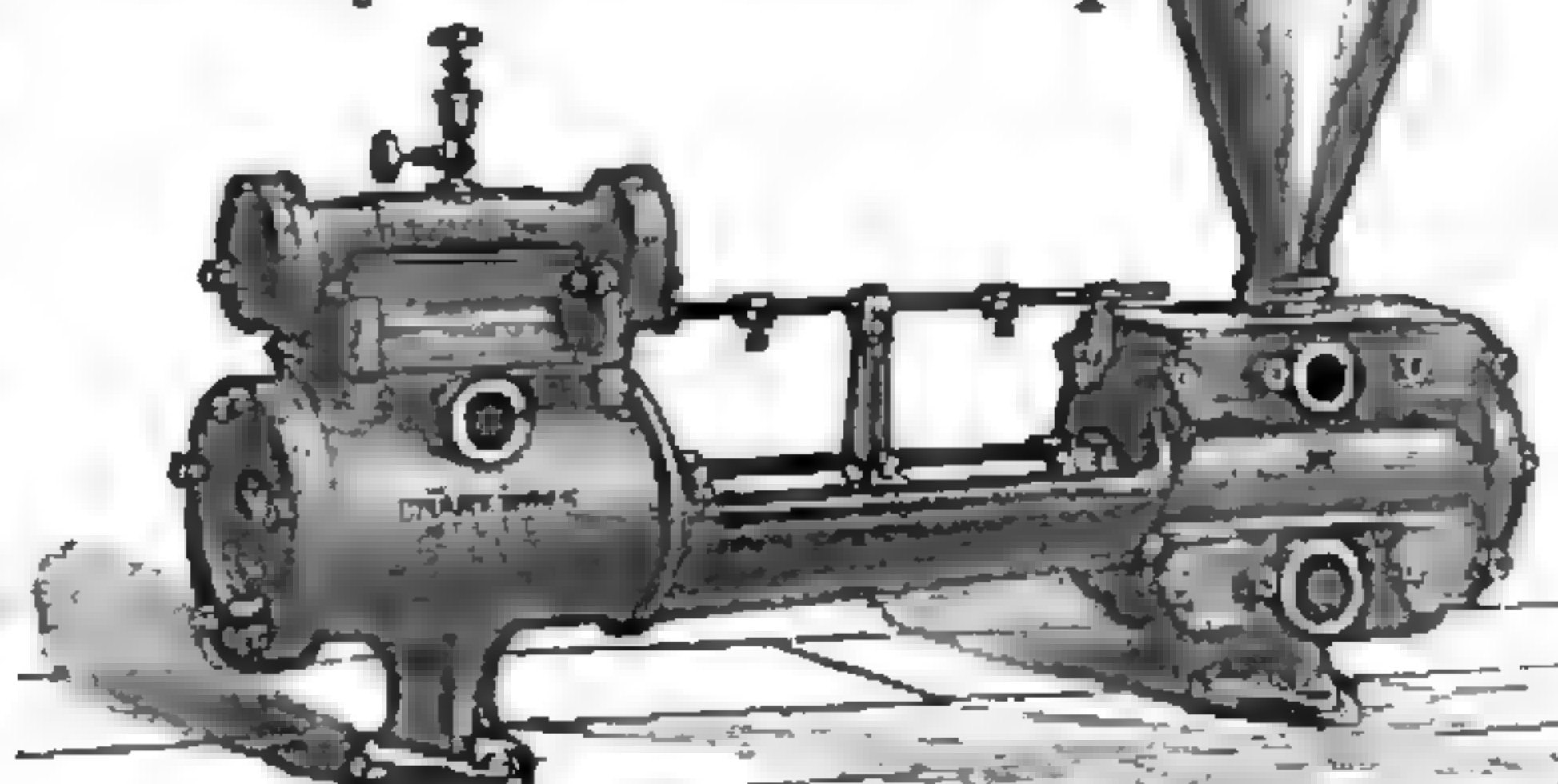
Also Manufacturers of
Axle and Gear Grease.

Send for descriptive circular.

HOLLAND & THOMPSON,
217 River-st., Troy, N. Y.

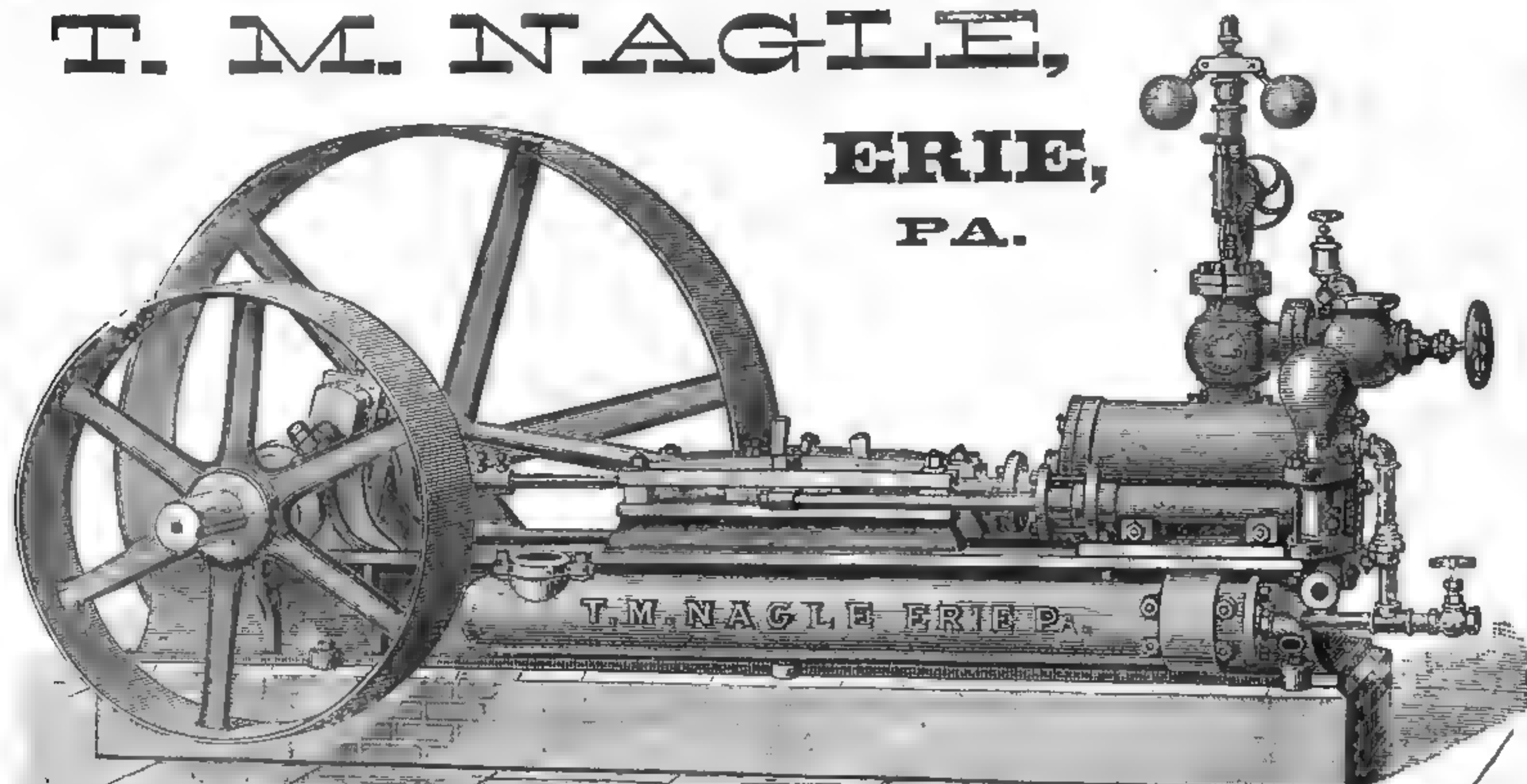
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Auxiliary Valve Steam Pump.

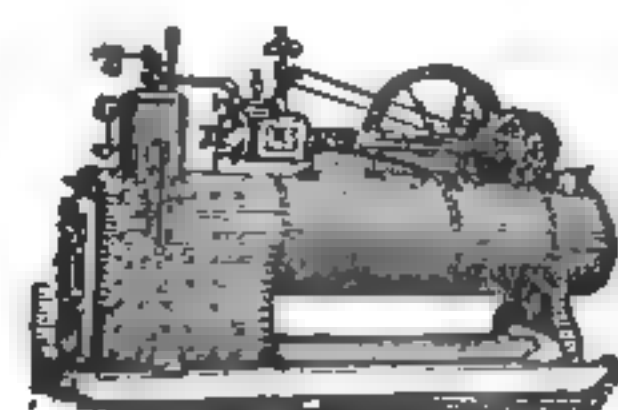


The above cut represents our new Auxiliary Valve Steam Pump, invented after several years of expe-
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Manufactured by
CRANE BROS. MFG. CO.,
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T. M. NAGLE,**ERIE,
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MANUFACTURER OF
PORTABLE,
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**STEAM ENGINES
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FARMS **#100**
A YEAR
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AMERICAN
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you need it.
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CONTAINS BARGAINS
EVERYWHERE.
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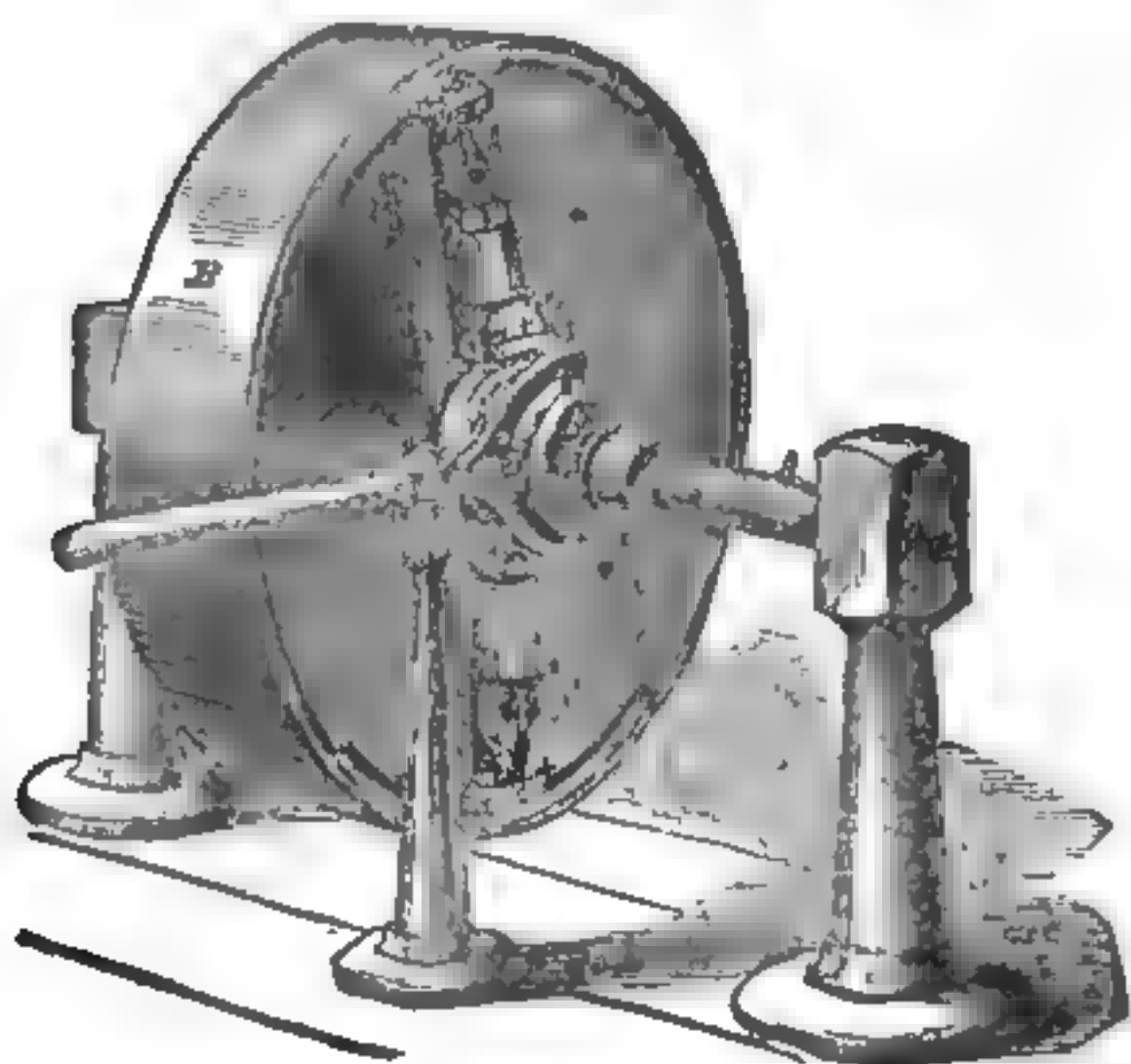
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We are making the neatest and most substantial 6x12 two and four Roller Mills, smooth and corrugated, ever put on the market. Millers wanting small rolls, as well as large, will find ours well made, neat and complete. Every pair has our Patent Automatic feed. The price is low down. Address,

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Manufacturers of Patent



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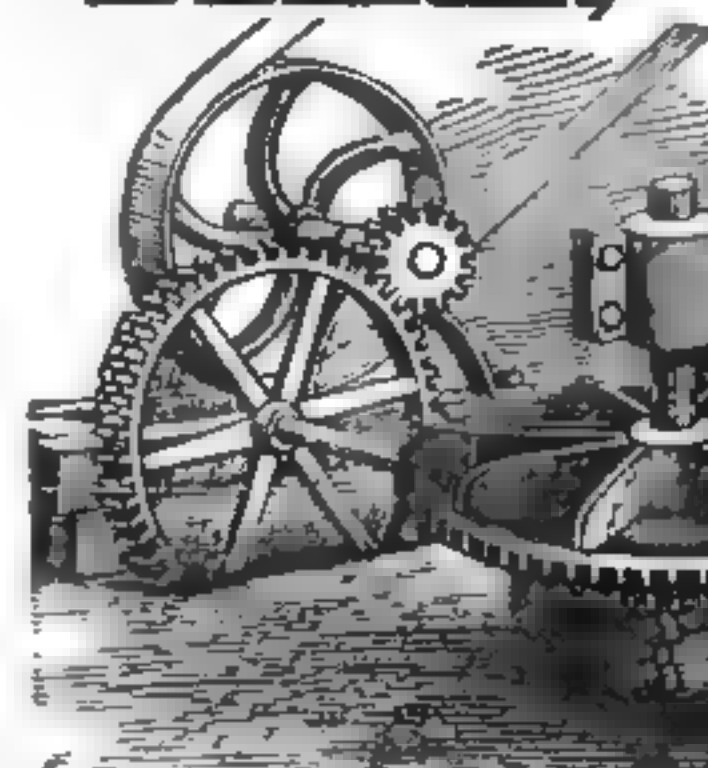
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MAKES
Round,
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TILE.



Tile Machine,

for **HORSE** and
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WOOD BELT PULLEYS,

From 10 inches to 15 feet in diameter. For any size belt. Secures to the shaft without keys, set-screws, bolts or pins.

Cone Pulleys, Split Pulleys, Dead Pulleys.

doing away entirely and completely with the LOOSE-PULLEY NUISANCE. Also, the

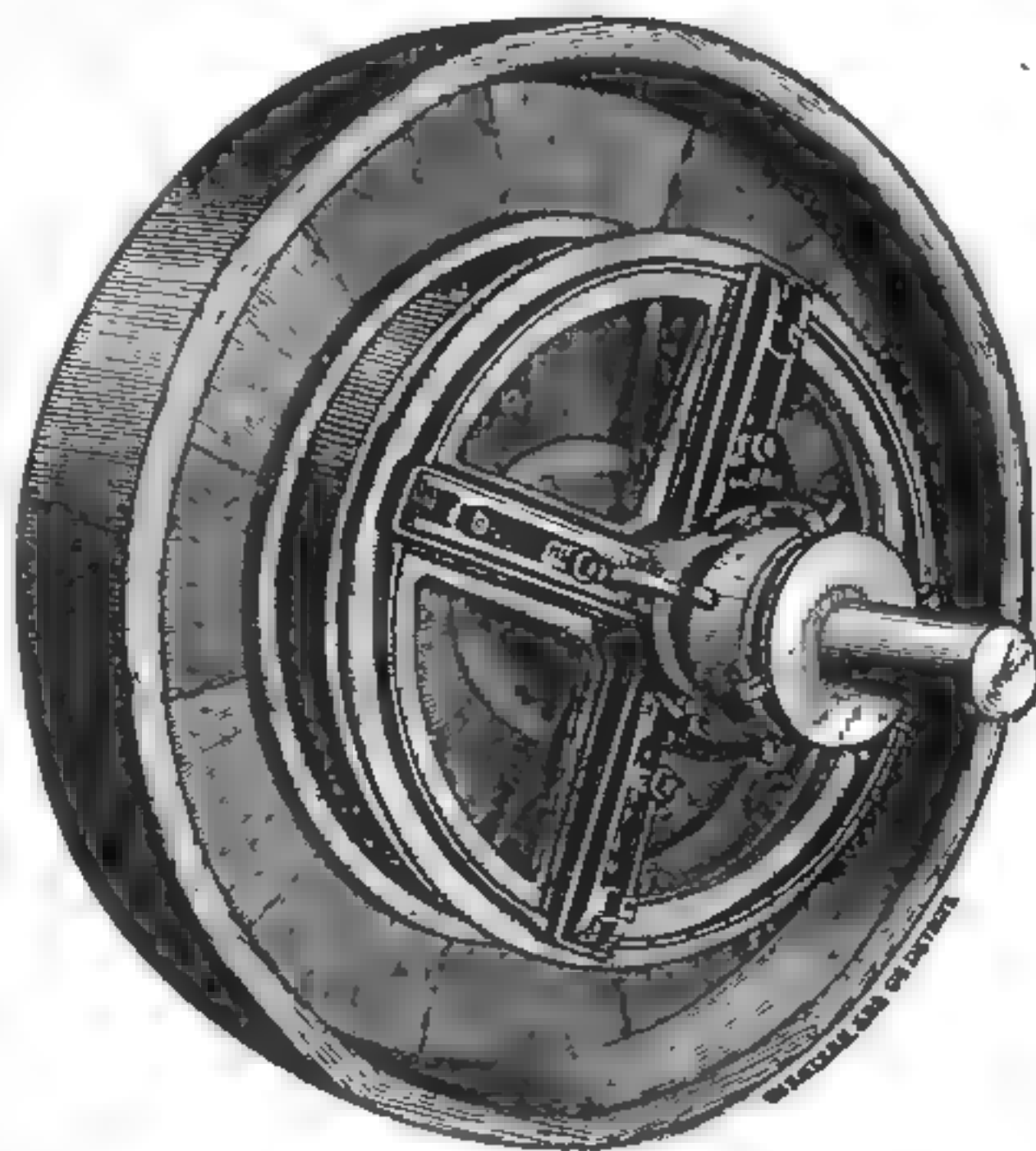
BEST CLUTCH

For Pulley or Coupling ever devised. When in use as Coupling, or attached to Pulley for driving any width belt, the Clutch is thrown off or on gradually and without jar. Ask for circular.

Taper Sleeve Pulley Works,

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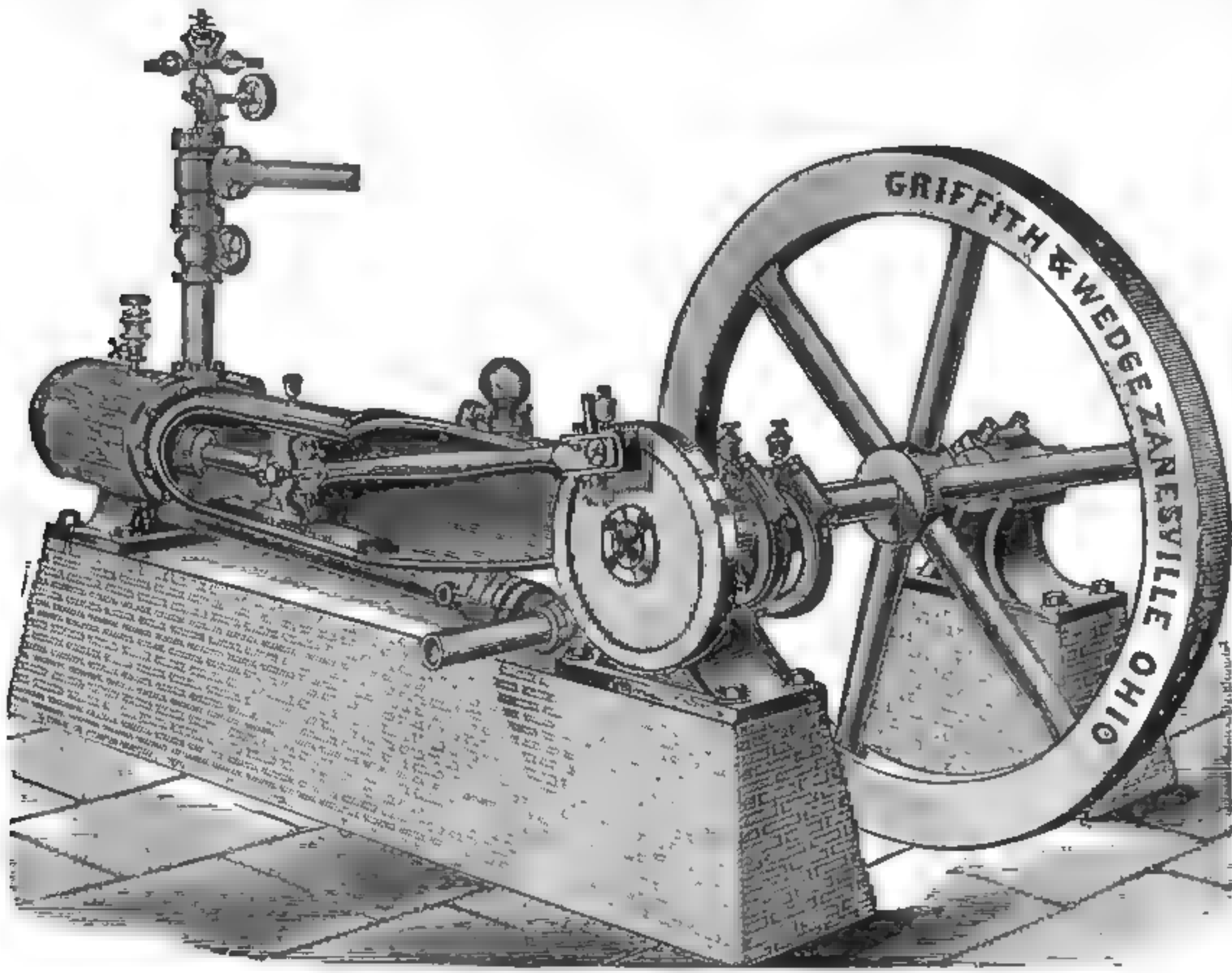
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SAW MILLS,

The Most Powerful and Safest Portable Engine in the World. Their Capacity Unsurpassed by any in the Market. Write for Catalogues and Prices to

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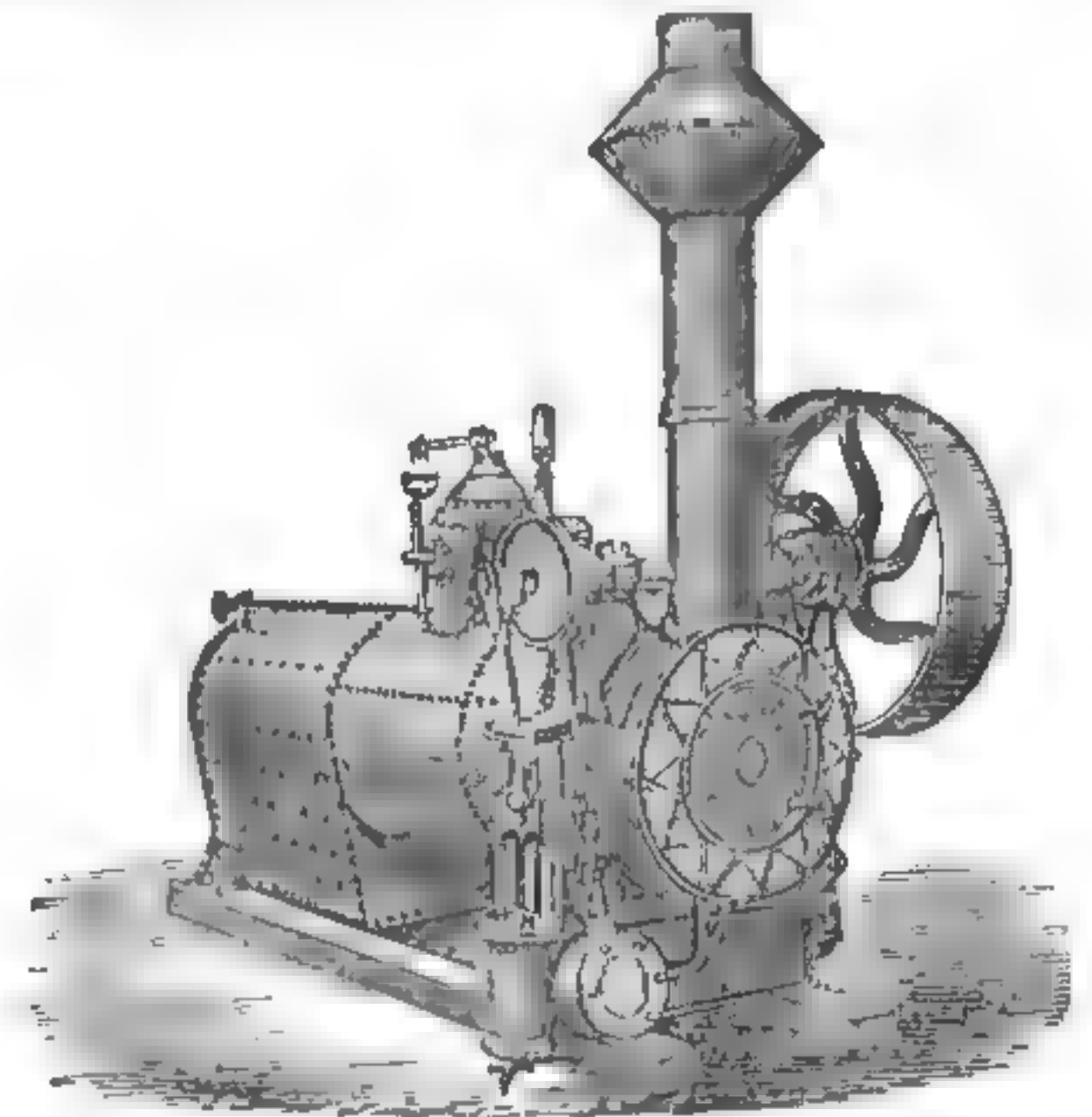


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STATIONARY ENGINES,

Combining the Maximum of Power and Economy with the Minimum of Expense.

SEND FOR CIRCULARS.



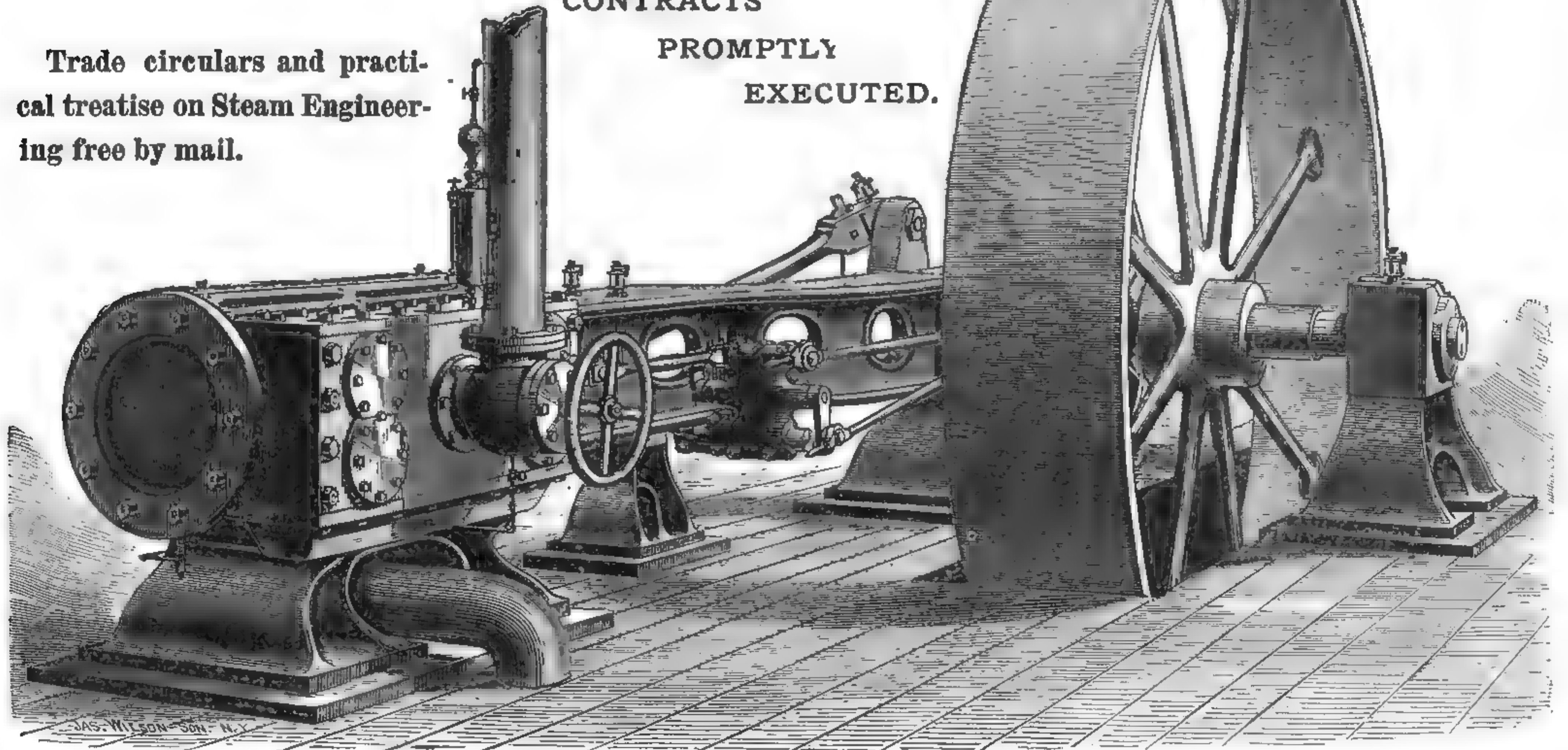
The Buckeye Automatic Cut-Off.

Trade circulars and practical treatise on Steam Engineering free by mail.

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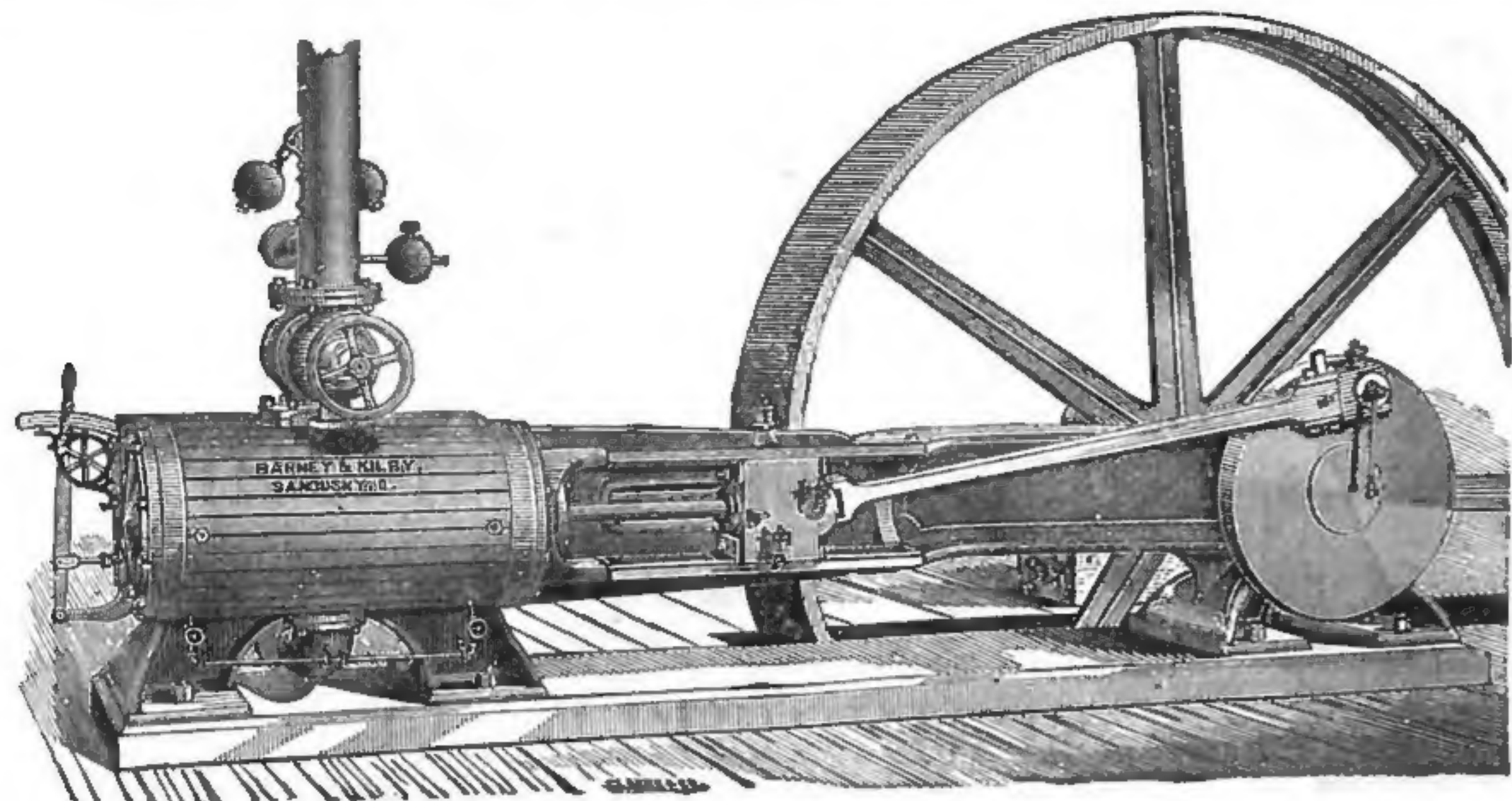
EXECUTED.



These engines are carefully constructed for heavy and continuous duty, at medium or high rotative speeds. Highest attainable economy in consumption of steam, and superior regulation guaranteed. Address

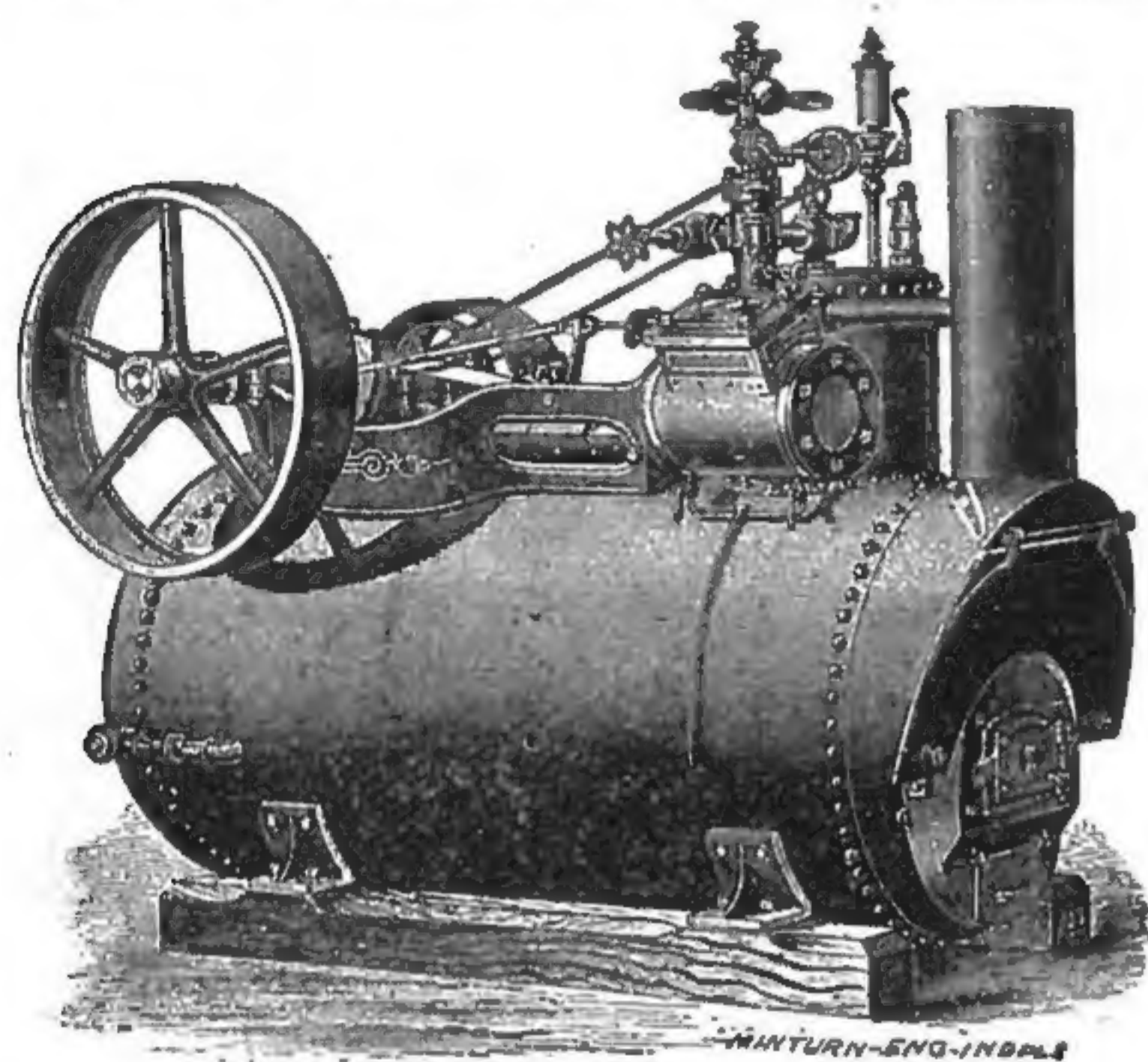
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Good proportions, symmetrical outlines, good material, superior workmanship, easy access to all parts, smooth running, and economy in steam consumption are the features we claim for this Engine.



BOOKWALTER ENGINES.

UPRIGHT ENGINES:

3 Horse, 4½ Horse, 6½ Horse and 8½ Horse Power.

SAFE, SIMPLE AND DURABLE.

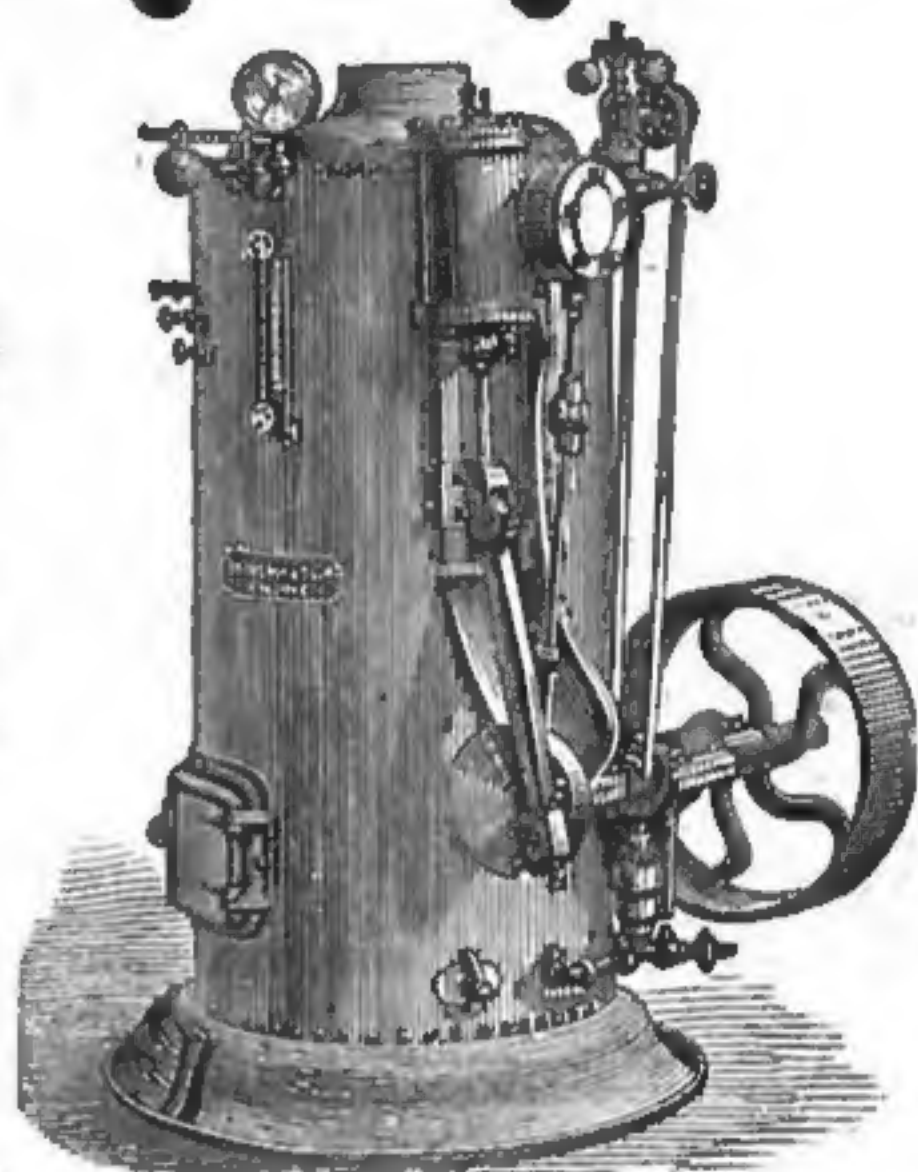
Over 3,000 in Successful Operation.

NEW STYLE 10 H. P. HORIZONTAL ENGINE.

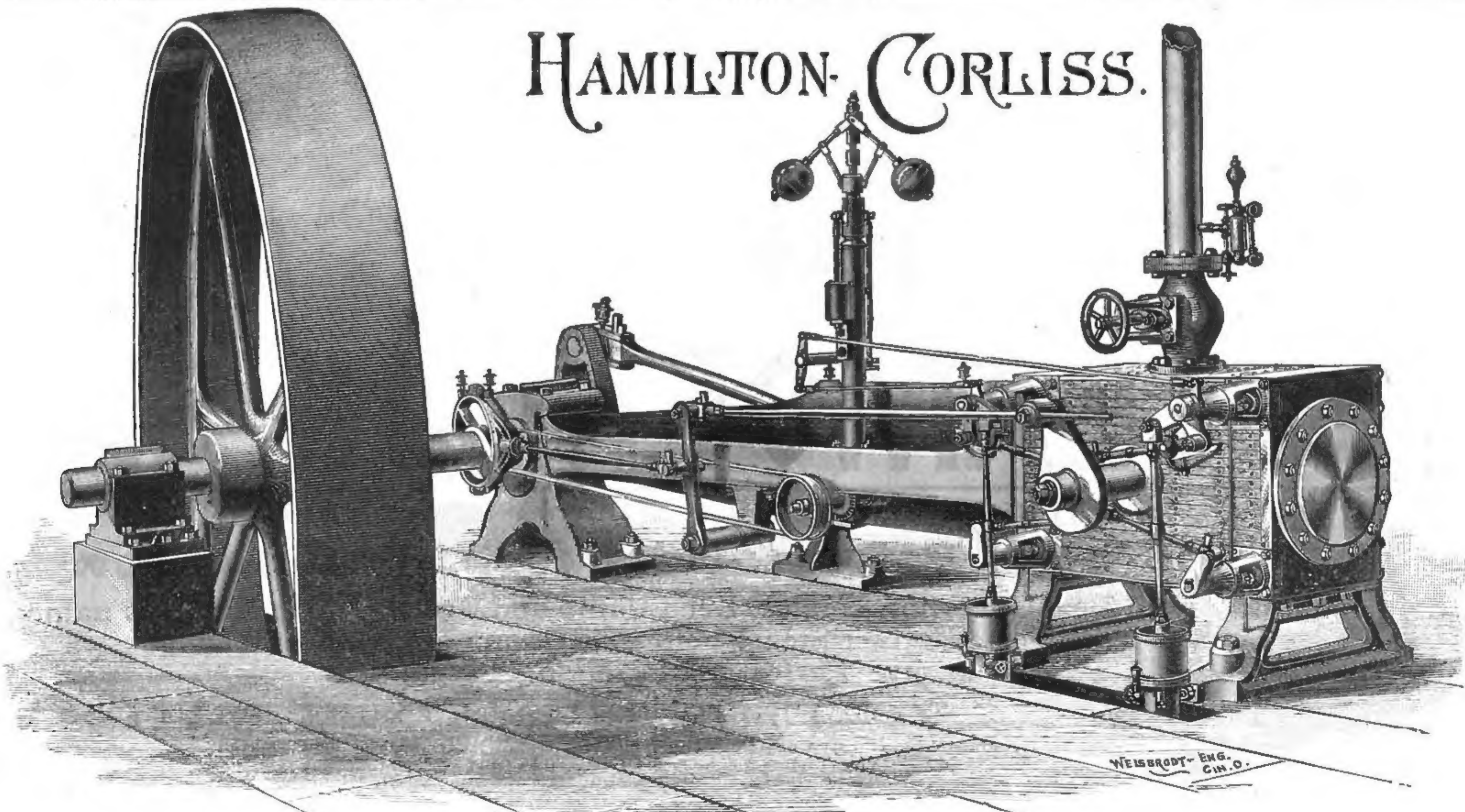
Center Crank Engine. All wrought iron Return Flue Boiler. Compact, Substantial and handsomely finished. Illustrated pamphlet sent free. Address

JAMES LEFFEL & CO.,
SPRINGFIELD, O.

Eastern Office: 110 Liberty-st., New York.



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CLOSE REGULATION AND BEST ATTAINABLE ECONOMY OF FUEL AND STEAM.
HIGHEST EFFICIENCY AND SUPERIOR CONSTRUCTION. MADE IN ALL SIZES, FROM 50 TO 300 H. P.
CORRESPONDENCE SOLICITED.

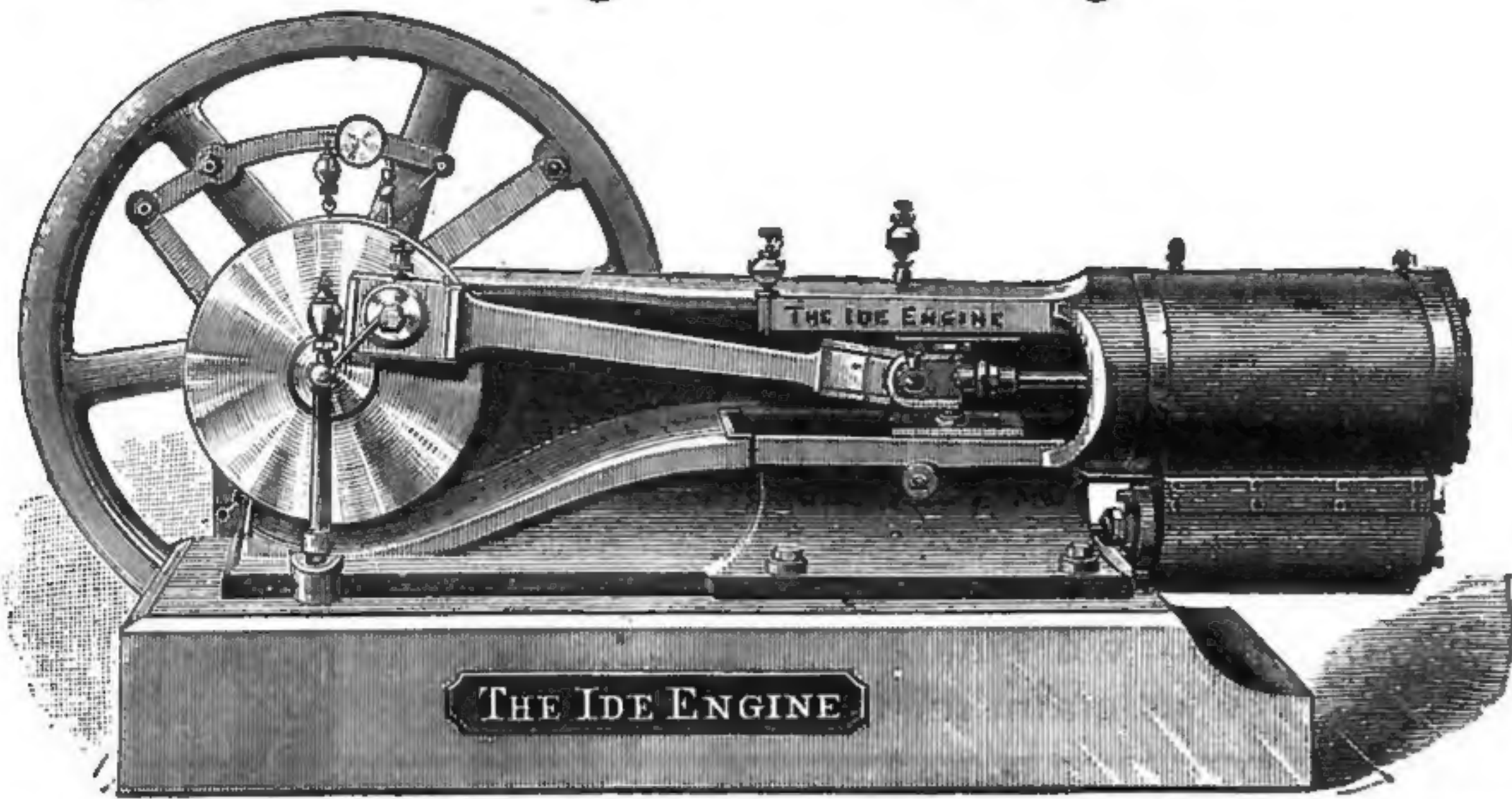
THE HOOVEN, OWENS & RENTSCHLER CO.,

Builders of all styles of Engines, Boilers, Saw-Mills, Etc.,

BRANCH OFFICE, No. 811 North Second Street, ST. LOUIS, MO.

HAMILTON, OHIO, U. S. A.

THE IDE ♦ AUTOMATIC ♦ CUT-OFF ♦ ENGINE



High Speed. High Economy.
PERFECT REGULATION.

SUPERIOR ♦ CONSTRUCTION

A. L. IDE, Maker,
SPRINGFIELD, ILL. U. S. A.

Diagram No. 4 was taken from 80-horse power Ide Engine in the Morgan Roller Mills, Jacksonville, Ill., while driving all their machinery, which was making 100 barrels of flour and 150 bushels of corn meal per 24 hours' run. This engine was put in to replace a 14 by 48 inch slide-valve throttling governor engine, which required 90 pounds steam pressure on boiler to do the same work and run the same machinery that the Ide Engine runs with 75 pounds steam, cutting off at one-seventh stroke, and with 47 pounds steam pressure, cutting off at 2-5 stroke. (See Diagram No. 5, taken from same engine running same machinery at lower steam pressure.)

"THE IDE ENGINE is saving 33 1/2 per cent. in Fuel over our Old Engine."—Morgan Roller Mills, Jacksonville, Ill.

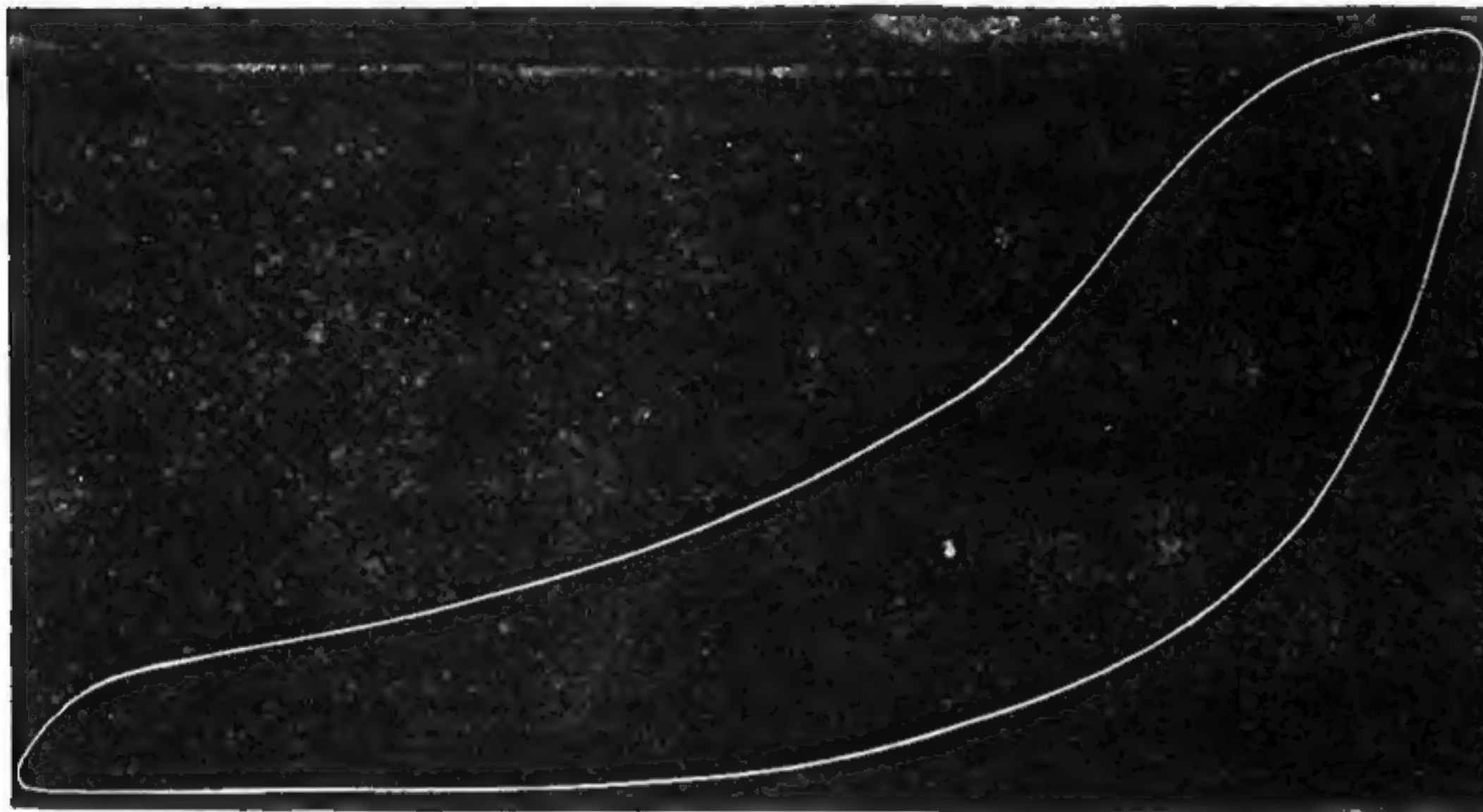


Diagram No. 4.

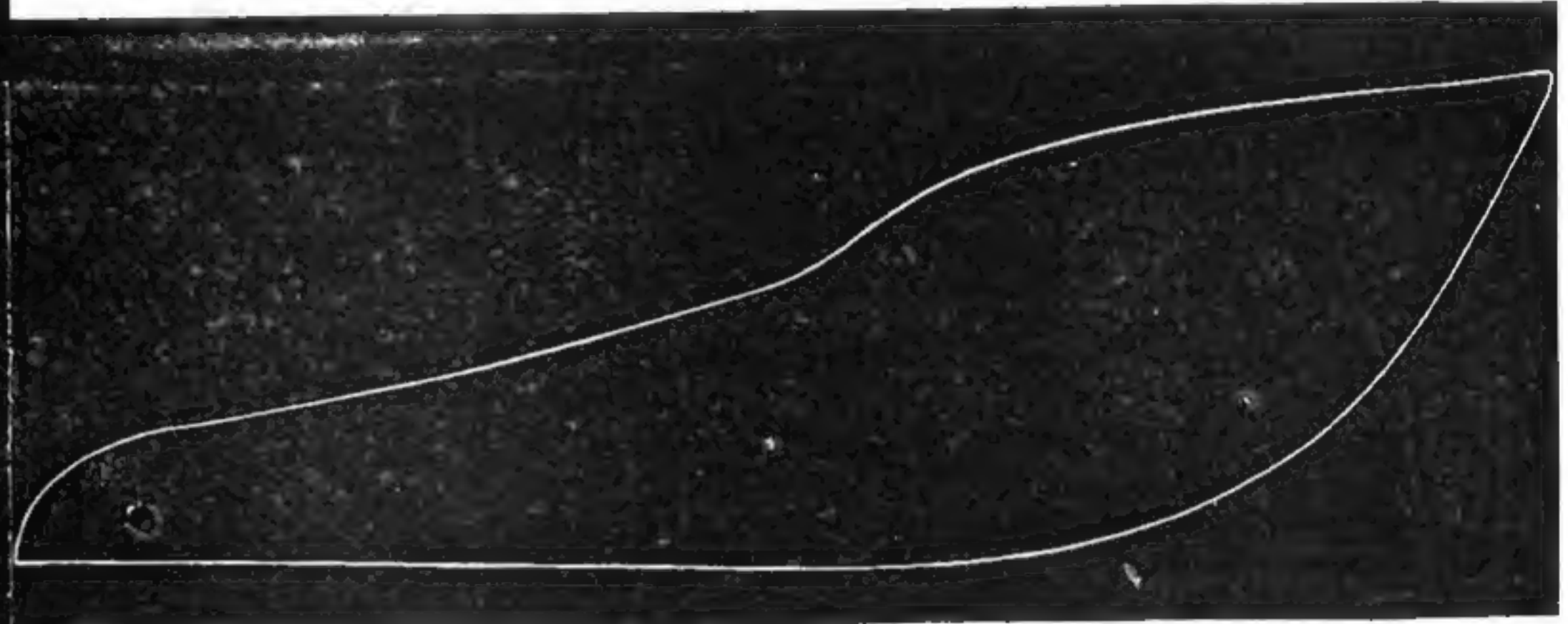


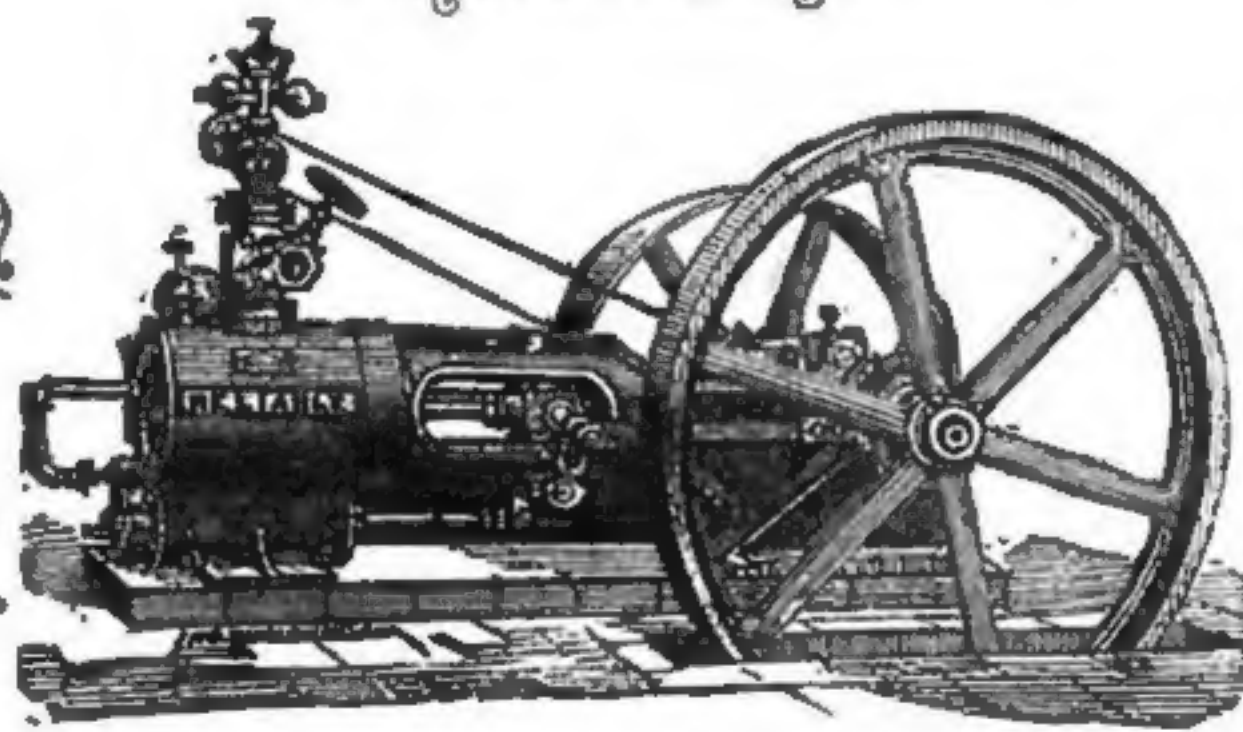
Diagram No. 5.

HORIZONTAL
—AND—
VERTICAL.

NEW DEPARTURE

ECONOMICAL,
EFFICIENT,
DURABLE.

We are Making and Selling
AN ENGINE A DAY.



More than 800 in Daily Use,
All Giving Perfect Satisfaction.

STEAM & ENGINES

At Nearly 50 Per Cent. Less than Former Prices.

\$250 for Ten Horse Power to \$550 for Fifty Horse Power.

Engine complete with Best Governor, Heater, Feed Pump and Trottle Valve at prices named.
Each Engine Tested under Steam before shipment, and Guaranteed to give Perfect Satisfaction.

ALWAYS RELIABLE, SURE AND EFFICIENT.

These Engines are well adapted to *MILLING*, and are in extensive use throughout the country for that purpose. We refer to the Nurdyke & Marmon Co., who adopted our Engines after most thorough trial, as first-class motors for their celebrated mills, fully assured that they met every requirement as such. All in want of Engines will please send for circulars, which give scores of voluntary testimonials and hundreds of references in favor of these Engines by persons who have them in daily use. We are proprietors of

♦ **THE HEALD AND SISCO CENTRIFUGAL PUMPS** ♦,

Of world-wide celebrity, and also manufacturers of *COMBINED ENGINE AND PUMP*. Send for circulars. In ordering circulars or pamphlets please mention *THE MILLSTONE*. Address

HEALD & MORRIS, Baldwinsville, Onondago Co., New York.

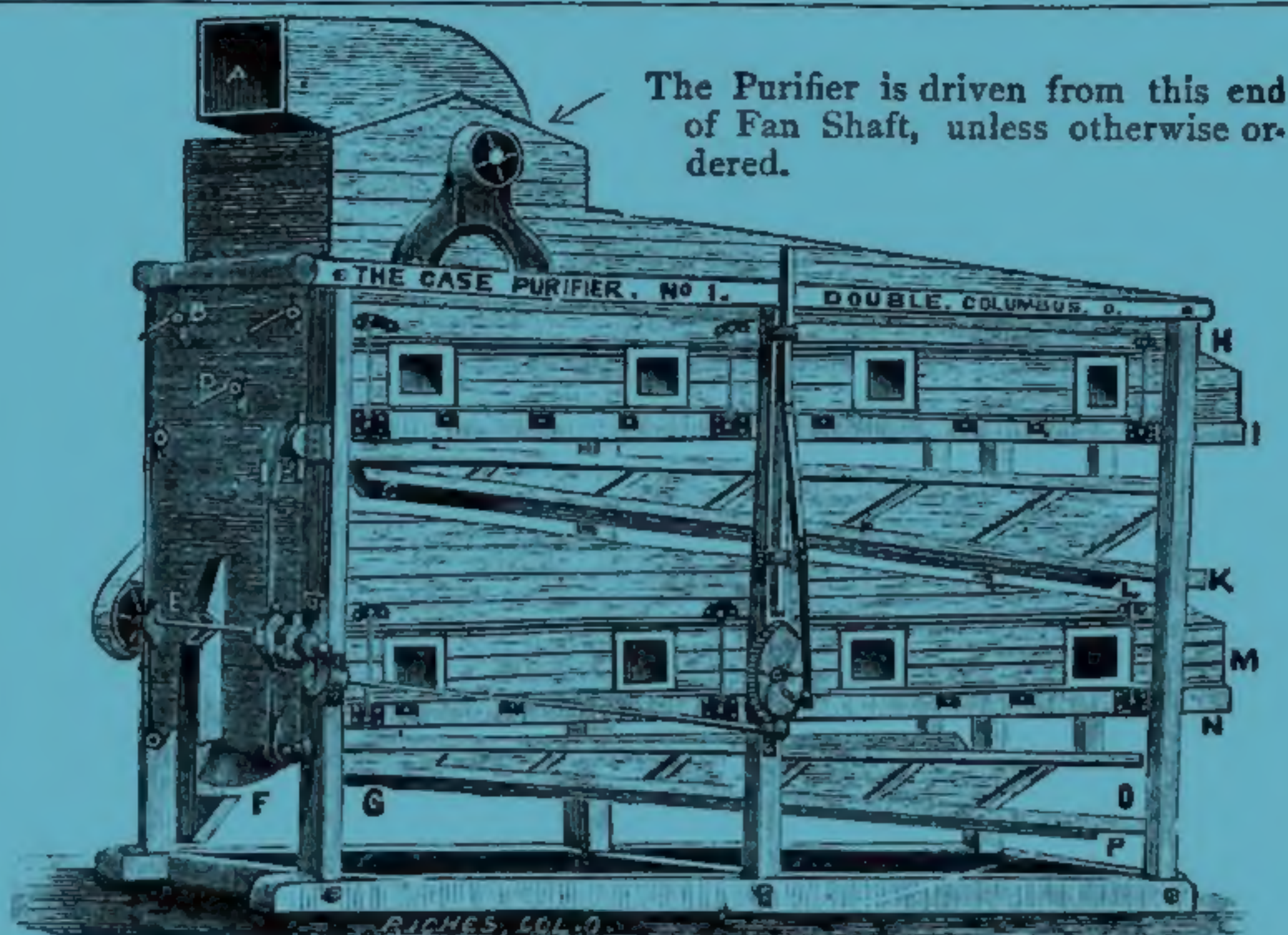
(FORMERLY HEALD, SISCO & CO.)

READ THIS TESTIMONY!

GIVEN UNDER OATH.

THE CASE MIDLINGS PURIFIER.

A—The fan spout is reversible and can be made to blow toward either end of purifier.
The fan can be placed on top or end of purifier—when on end it increases the length 39 inches, and diminishes the height 22 inches.
B—Air-valve upper riddle.
C—Cut-off for upper riddle, sliding one-half the length of riddle.
D—Air-valve, lower riddle.
E—Upper riddle tails off here.
F—Lower riddle tails off here.
G—Cut-off for lower riddle, sliding one-half the length of riddle.



H—Feed-box for upper riddle.
I—Bolting cloth for upper riddle.
K—Purified middlings from upper riddle.
L—Cut-off from upper riddle.
M—Feed box for lower riddle.
N—Bolting cloth for lower riddle.
O—Purified middlings from lower riddle.
P—Cut-off from lower riddle.

The upper and lower halves are each a complete machine, and can be run together or separately, as desired.

In the suit brought by the Smith Company against us for infringement of their patents, in which we were victorious, there were two large volumes of testimony taken, from which we make a few quotations. We will add, that in the matter of the great superiority of our Cloth Cleaner over the Brush, they offered no rebuttal testimony, some of their own witnesses, from whom we quote, testifying to this fact. This testimony, under oath, of the superior merits of the Case Purifier, will help to sustain the fact, which hundreds of millers now know, that we are building the best Purifier ever constructed. We make this statement with confidence, and will back it up with money if necessary, because we absolutely know our claim is just and true.

GEORGE E. RUSSELL, of Shadesville, O., testifies:

Q Which is the superior cloth cleaning device, that of the Case machine, or the brush of the Smith machine?

A I think the Case cleaning device is superior to the Smith, because it keeps the cloth clean, both on the top and on the bottom.

Q State which is the superior machine, and give your reasons why.

A I think the Case machine the best I ever saw, because it cleans middlings without waste and has a perfect feed—a perfect cleaning device. It takes less space than any other machine of that capacity. It requires less power to run it.

JAMES KIRK, of Massillon, O., testifies:

Q State whether or not in the Smith machine the top of the cloth is kept clean by this traveling brush?

A I have found in these machines that the fine fuzzy stuff would sometimes accumulate on top of the cloth.

Q How did you remove that?

A With a brush—a hand brush, swept a little and gave a few taps on the riddle.

Q State whether or not in the Smith machine there is ever any gumming up of the cloth. If so, how did you cleanse it?

A Yes, one time I helped to wash them off with alcohol.

Q State whether the Case machine ever became gummed up?

A No.

Q Which is superior, the cloth cleaning device or the brush of G. T. Smith's machine, and state your reasons in the answer you give?

A The cleaning device of the Case machine in my opinion is superior to the brush, for the reason it keeps the cloth perfectly clean and is not so liable to gum the cloth as the brush.

Q From your experience as a miller, having used different kinds of purifiers, state which is the superior machine and give your reasons for your opinion?

A The Case machine is the superior machine, from the fact it has got a better feed, better cleaning device, better cut-off, and it takes up only the room of one machine, and you get two machines in one.

Q State the capacity of the Case and Smith machines?

A The Case machine is double the capacity of the Smith.

Q What is the capacity of Commin & Allen's mill you worked in, and how many purifiers were there used in it?

A The capacity of the mill is 400 barrels, and we used four Case machines, one Standard and one Smith. Two of the Smith machines were replaced by the Case.

Q How many machines would it require to purify the middlings for that mill if the Smith machines alone were used?

A In my opinion it would require at least ten machines, ten or twelve feet long.

FREDERICK F. MARKLE, of Columbus, O., testifies:

Q State how thoroughly the cloth in the Case machine is cleaned by the cleaning device?

A You might state that the cloth is kept absolutely clean.

F. E. LEHMAN, of Columbus, O., testifies:

Q State how thoroughly the cloth in the Case machine is cleaned?

A It is kept thoroughly clean. It is cleaned on top as well as on the bottom.

Q Is the cleaning action of the cloth cleaning device of the Case machine such as to keep the meshes of the cloth entirely clean across the entire width of the cloth?

A It is.

JOHN M. CASE, of Columbus, O., testifies:

Q State how thoroughly the cloth was cleaned in the Case machine?

A When the machine has been driven up to its proper speed I have never known an instance in which the cloth was not what might be termed thoroughly cleaned, both upon the top and bottom.

As the inventor of this machine it has become necessary for me to travel extensively, looking after the setting up of the machines, and from these machines which I have put in, and seen in operation, I have arrived at the facts in relation to the thorough cleaning of the cloth.

JACOB B. MILLER, of Ashley, O., testifies:

Q State how the cloth cleaning device of the Case machine operates, and in what manner does it clean the cloth?

A It cleans the cloth by vibration. By the five slats moving back and forth very slow and the cloth tapping against the slats and the slats tapping against the cloth.

Q How thoroughly does the cloth cleaning device clean the cloth?

A It cleans it thoroughly.

MACK SCHAUER, of Beaver Falls, Pa., testifies:

Q How thoroughly does the cloth cleaning device of the Case machine clean the cloth?

A I have never yet needed to brush them or use any other means of cleaning them.

WILLIAM H. BURRIER, of Baltimore, Md., testifies:

Q State how thoroughly the cloth cleaning device of the Case machine cleans the cloth?

A It keeps the cloth clean at all times. I have never seen the cloth clogged up with anything since we have been using the machine. It has always kept the meshes clean better than any other purifier I have used.

JAMES B. MORGAN, of Baltimore, Md., testifies:

Q How thoroughly does this cloth cleaner clean the cloth?

A It cleans it in a perfect manner all over the surface top and bottom.

VINCENT VALENTINE, of Baltimore, Md., testifies:

Q Give the names of the different purifiers you have set up and have adjusted?

A LaCroix, the Hunter, Garden City, G. T. Smith, the New LaCroix and the Case, and also the Electric.

Q In what manner is the cloth in the Case machine cleaned?

A It is done by the trembling of the slats. When

the cloth is clogged up, it drives the particles back upon the top of the cloth.

Witnesses for the G. T. Smith Co. Testify as Follows:

ZENAN C. ELDRED, of Jackson, Mich., testifies:

In answer to cross-questions as to which is superior cloth cleaners the brush or strips of wood replied: I think the wood is a splendid brush, and I ain't sure but I would say the better of the two, if you want my opinion.

MYRON W. CLARK, agent for the G. T. Smith Co., testifies:

Q Was the cloth of the machines at Akron, O., referred to well cleaned, or not?

A They were.

WILLIAM F. PUTMAN, of Cleveland, O., witness for the Smith Co., testifies:

Q How thoroughly was the cloth cleaned in the Case machine at Ashley, O?

A Cleaned very nicely—cleaned very thoroughly.

Q Could not the Case (double) machine be clothed as you have given the clothing of these two Smith machines, and if so, would you say the effect would be the same?

A If clothed the same as these two (Smith), it would reach the same result.

Q Do I understand you to mean that the Case machine is substantially a double machine and could be so clothed as to produce the same results as two Smith machines? The question refers to one double Case machine and two Smith machines.

A If the capacity of the first shaker on the Case machine is as great as the shaker on the Smith purifier, and the graded air current is as good, and the numbers of the cloth are so arranged, it could be used to purify and re-purify middlings with the same results (as two Smith machines).

Q The difference then between the two, the Case double on the one hand, and two Smith machines on the other, is simply a difference of clothing, is it, assuming the blast and capacity (square feet of cloth) are the same?

A I think so.

Q In what mill are you now employed, and what is your position in that mill?

A I am head miller of the Cleveland Milling Co.

Q What is the capacity of that mill?

A Nine hundred barrels in 24 hours.

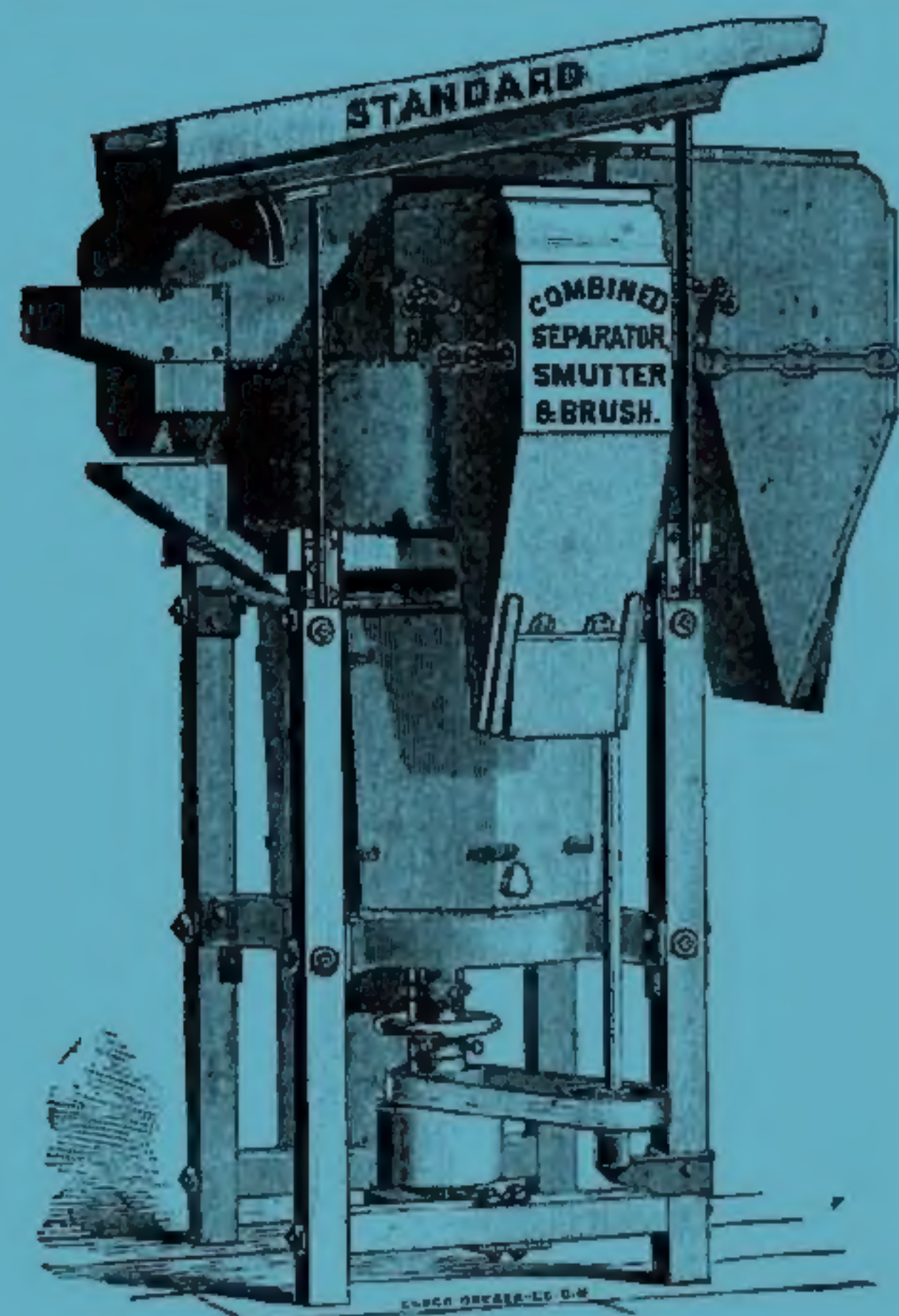
It will be seen from the foregoing testimony that not only our witnesses, but the leading witnesses for the Smith Company, when driven into a corner, have been compelled to testify to the superior merits of the Case machine over the Smith, admitting that it has the superior cleaning device and that one of the Double Case machines is equal to two of the Geo. T. Smith.

We know these facts to be true and will go a thousand miles to back them up by entering into a test with one of our double machines against two of the Geo. T. Smith machines.

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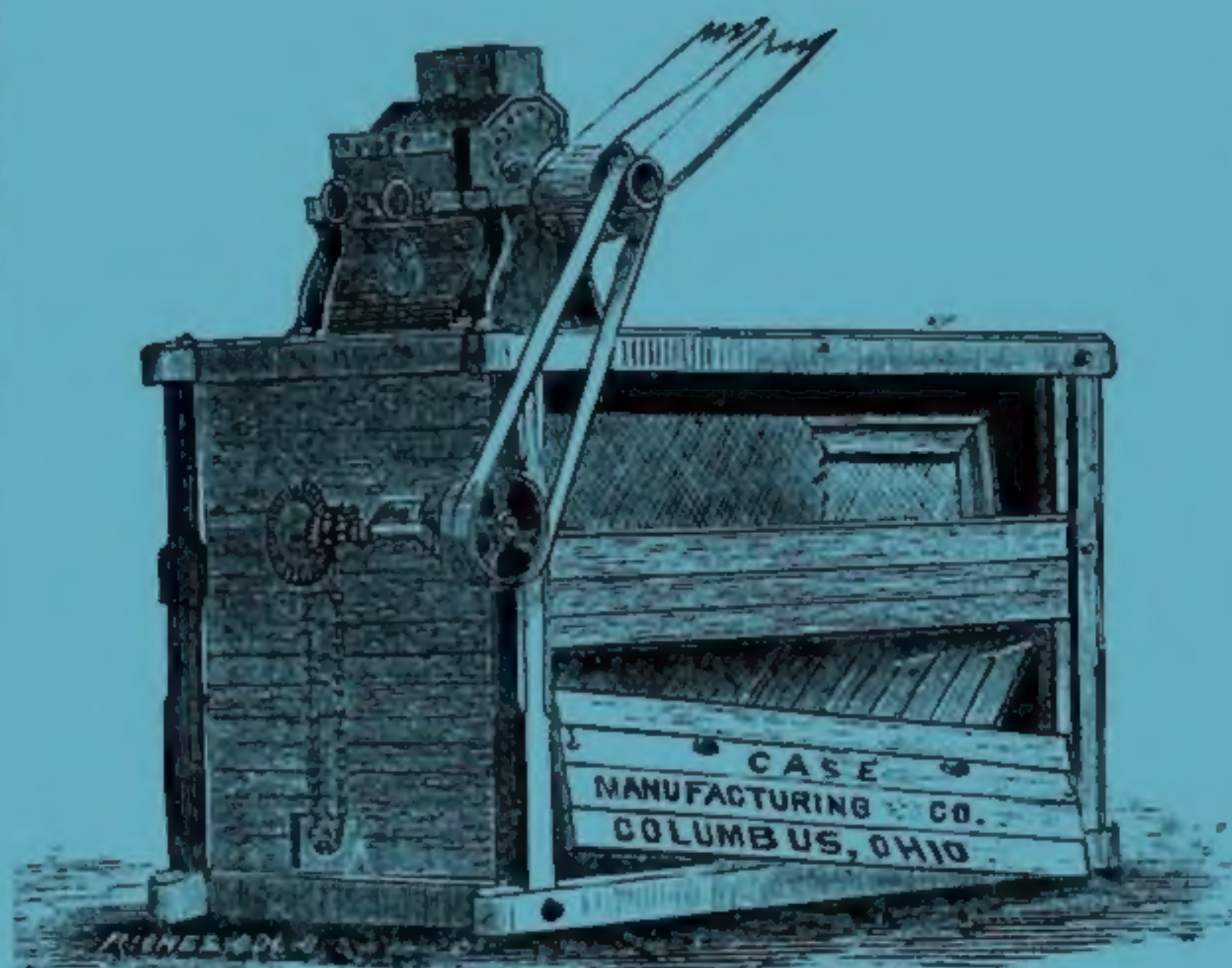
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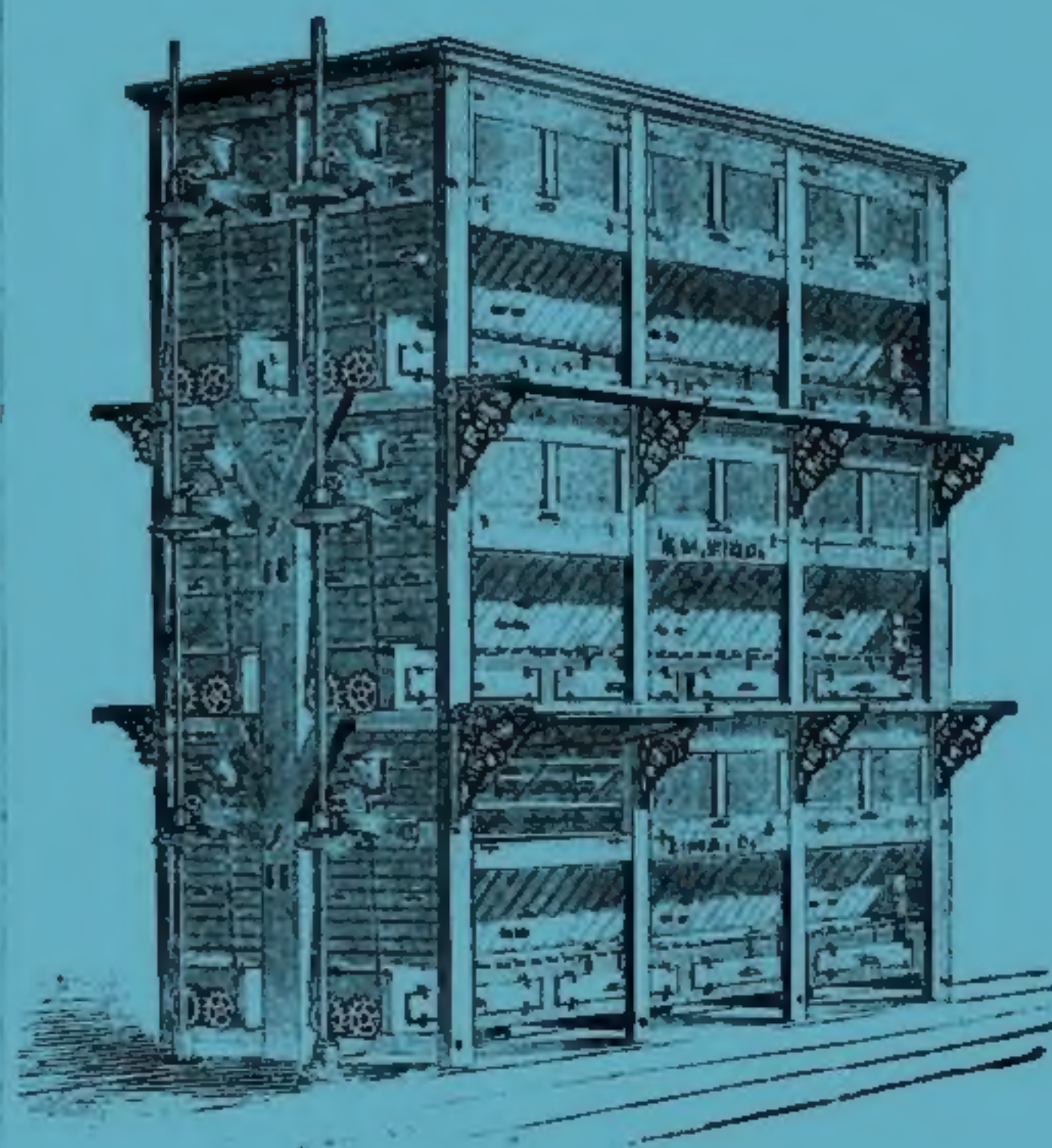
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